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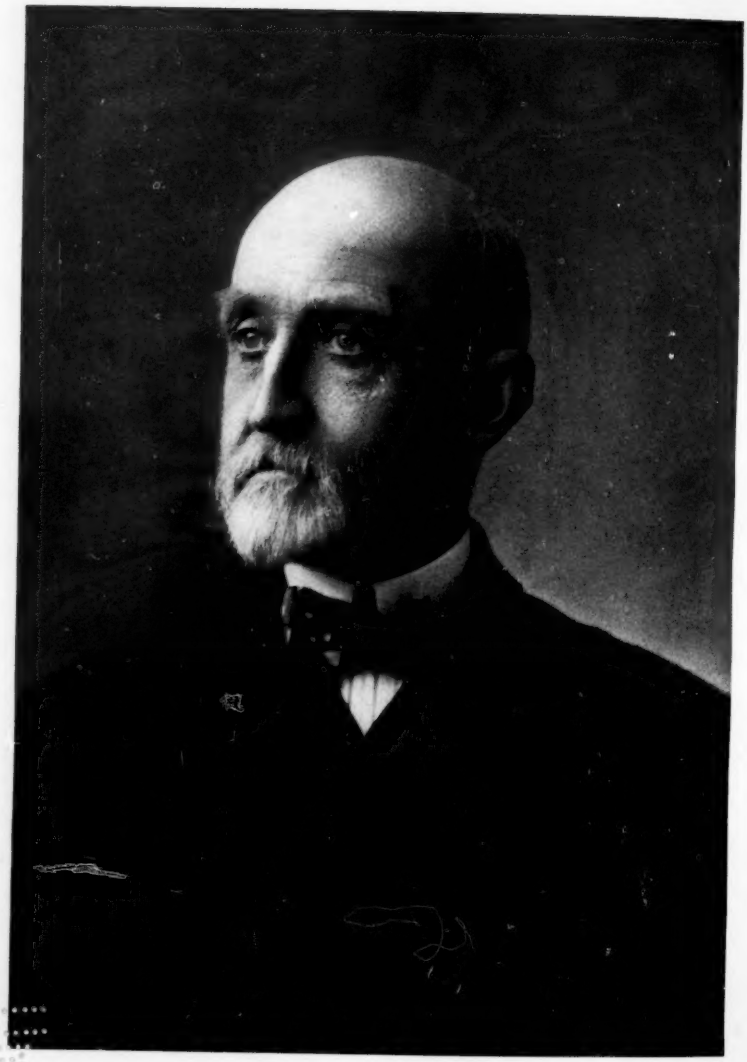

ALFRED THAYER MAHAN

PRIZE ESSAY, 1915

"The Role of Naval Doctrine in Naval Warfare."

Motto.—"Let us learn to think in the same way about fundamental truths."—DARRIEUS.

By LIEUT. COMMANDER DUDLEY W. KNOX, U. S. Navy.

HONORABLE MENTION

First.—"An Air Fleet: Our Pressing Naval Want."

Motto.—"Too late on earth may be too soon in hell."

By LIEUT. COMMANDER THOMAS DRAYTON PARKER, U. S. Navy.

Second.—"Tactics."

Motto.—"Our tactics should place our ships in such positions that their guns and torpedoes can be used most effectively."

By ENSIGN H. H. FROST, U. S. Navy.

Third.—"Defense Against Surprise Torpedo Attack."

Motto.—"The Witch of the North took an eggshell with a little Blue Devil inside."

By ENSIGN R. T. MERRILL, 2d, U. S. Navy.

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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

ALFRED THAYER MAHAN
IN MEMORIAM.

To very few has it been given so to influence the current of men's thoughts as vitally to affect human development and even to shape the course of history itself. The dominance of the Aristotelian philosophy in the intellectual world of Europe endured for twenty centuries until displaced by Bacon's Novum Organum. In more recent times, the Social Contract of Jean Jacques Rousseau is admitted to have played no small part among the determining causes of the French Revolution. Without a Treitschke, Pan-Germanism would have remained a vague aspiration indulged in by a restricted circle of German thinkers. It is needless to multiply instances in which the ideas of one man have directed the current of events; the fact itself is too widely accepted to require demonstration. Among the number of those who have swayed their fellows, opened their eyes to a wider vision, pointed out the hazards in their path and the channel leading through those hazards to national or individual safety beyond, sober judgment must include that member of our own profession who, after an honorable career during which he shed a luster upon the American Navy of which all Americans are proud, none so much so as his brother officers, has recently departed from our midst leaving behind him a stainless record and a place unfilled and unfillable. It were well could we look for a second Mahan with his vast

knowledge and accurate logic, but candor forbids us to expect. We are only permitted to hope—and in how many doubts that hope is shrouded—that as time goes on another may arise endowed with like passion for truth, like ability and the like gift of making clear and obvious what all have gazed upon without seeing.

Three natures were combined in this exceptional personality. First of all was the Christian gentleman, devout and earnest, giving daily, practical, outward expression to an inward conviction at once sincere and fundamental. His belief in Christ's mission and in the world to come as revealed in Holy Writ was without shadow or question. Things earthly and material might not be what they seemed. *Errare est humanum.* Even so well poised a mind as his might be mistaken in its findings, but no possible chance of going astray existed or could exist in complete reliance on the promises of his Lord and Master to all those who truly follow Him. And follow Him Mahan did loyally throughout his years from youth to age. His abiding sense of duty, the keynote of his character, forbade a merely perfunctory compliance with ecclesiastical requirements and forced him to take active part in the management of the religious communities to which, from time to time and in various places, he belonged and to represent them at annual conventions of the Protestant Episcopal Church. For many years he was connected with its Board of Missions and with the Church Institute for Seamen. During a shorter period he was a member of the Church Institute and of the Church Mission for Help. All his charitable interests lay in the church through which alone, to the extent of his means, he sought to aid his fellow men. This devotion to his church was the manifestation of a faith which controlled every thought and every act of his life. All his serious undertakings, all his important letters even, were preceded by an appeal for Divine guidance. It is impossible to understand Mahan unless this mental attitude is recognized in its full power. Those ignorant of this side of his character may read his little book, "The Harvest Within," and in the reading find profit to their own souls.

The second of the natures in this composite individuality sought scope in his chosen calling as a naval officer. Duty, in whatever form it came, was sacred. Invariably he gave to its performance the best that was in him. That he distinguished himself preeminently on shipboard cannot be claimed. Luck or circumstances

denied him the opportunity of doing things heroic, and his modesty those purely spectacular. As a subordinate or as captain of a single ship, what he did was well done. No further proof of his qualities in this respect is needed than the fact that, at the outbreak of the Civil War, when finishing his midshipman's cruise, he was asked by a shipmate, an officer who expected a command, to go with him as "first lieutenant." To his colleagues of the Old Navy this invitation was the highest form of professional approval. The fates decreed that the wider field should not be his wherein, as commander-in-chief of a fleet in war time, he could have exhibited the mastery he surely possessed of that art with which his name will forever be indissolubly linked.

It is the third of the natures mentioned by which he will be known of men so long as the doors of the temple of Janus remain open. For that nature no better descriptive phrase occurs to the mind than "Naval Philosopher." Historian and biographer he was, and none stood higher in his own chosen line as witness his works on sea power and his lives of Farragut and Nelson, but Mahan was far more than an analyst or a Boswell; he used history and biography as tools with which to forge a philosophy whose effects, stupendous, titanic, are visible this very day.

His treatises are standard the world over and are translated into many foreign tongues. When advice was asked from Cape Town as to what books should be acquired for a naval library there, the answer came back from London, "Buy Mahan." "But we have several copies already and money still to spend; what shall we get?" The reply was brief and to the point, "Buy more Mahan." So weighty were his utterances that, in the House of Commons, when naval affairs were under discussion, a member had only to remark, "Mahan says so and so," to enforce conviction and close that phase of the debate.

The regeneration of Great Britain's Navy which began in the nineties and was carried on under the Naval Defence Act of 1889 may be traced directly to Mahan's works. It has been said that the modern British Navy is Mahan's creation, an hyperbole which contains far more than a grain of truth.

Nor have other countries escaped the impact of his philosophy. His "Influence of Sea Power on History" opened the Kaiser's eyes to his impotence on the water and was, undoubtedly, one cause, probably the greatest single cause, of the upbuilding of his

fleet. If so and if, as believed by many, the passionate rivalry due to this upbuilding coupled with the realization that paramountcy on the land alone would fail to give Germany the place she regarded as her right in the world at large, may not this war raging at present in Europe be attributed in some measure to the effect of Mahan's teaching? Whether the teaching in this particular instance is well or ill, justly or unjustly, applied is a question which cannot with propriety be touched upon in these pages.

Says a British writer: "When we see all the nations who have been sitting at the feet of Admiral Mahan and reading his well-known 'Sea Power' books and who, having read, have believed, and having believed, have acted, we have the clue which explains why in recent years our legions of the sea have been drawn with an ever greater attraction around our coasts."

In person Mahan was tall, spare, erect, with blue eyes, fair complexion, hair and beard originally sandy. He respected his body as the temple of his soul and he paid it the homage of abstemious living, of outdoor games and abundant exercise. In manner he was modest to excess, dignified, courteous. Reticent in speech with people in general, those who enjoyed the rare privilege of his intimacy knew him to be possessed of a keen sense of humor and a fund of delightful anecdotes drawn from his long and varied experience. To such friends he was a most charming companion, so different from the grave, self-contained philosopher as he appeared to the rest and less favored of his acquaintance. His home life was ideal. He may be said to have been bound up in three things—his church, his family and his work. Outside of these, nothing counted.

A condensed statement of his services and of the honors conferred upon him in recognition of his epoch-making writings is appended, together with a list of the latter and the dates of their first publication; also a few extracts from appreciative letters of condolence. His books should be on the shelves of every naval officer, no matter under what flag he may be serving.

It is wholly without the scope of this notice which endeavors, however inadequately, to present the man as he was to those who knew him well, to dwell upon the importance of his professional works. Of that all the world is abundantly aware. But those who wish to know him more completely should read "From Sail to Steam," as entertaining a story of sea life as can anywhere be

found, brimful of fun, passing " from grave to gay, from lively to severe " with unexpected and fascinating suddenness. It depicts with master hand the transition from ships in which Drake and Hawkins would have felt at home to the present floating monuments of nautical engineering, as well as the no less momentous change from the able seamen of his boyhood to the trained mechanical expert of to-day.

While a view of Mahan's outlook on men and things may be gained in reading " From Sail to Steam," so valuable through its conscientious adherence to truth (in marked contrast with some of its kind that while eminently readable are often rather untrustworthy), quite as essential is " The Harvest Within," revealing as it does, Mahan in his attitude to his Creator. Thoroughly to understand Mahan, both these books should be studied—a labor of love which is commended to every American naval officer.

To suggest that the field for investigation such as Mahan's is exhausted would be an insult to his memory. No better tribute could be paid to it than to emulate his shining example. Thus, it may be confidently asserted, would he speak were his lips not sealed in death.

The Naval Institute is the navy's spokesman, in a literary way, for all that concerns naval history, science and art. Sympathizing deeply with his widow and children in their great bereavement, it is eminently fitting that the Institute, on behalf of the service at large, should claim the right to share in their grief and to mourn with them to-day the loss of what was and never again shall be.

RECORD AND PRINCIPAL SERVICES OF THE LATE REAR ADMIRAL A. T. MAHAN, U. S. NAVY

1840. Sept. 27, born at West Point, New York, son of Professor Dennis H. Mahan of the U. S. Military Academy.
1854. Matriculated at Columbia College in the city of New York.
1856. Sept. 30, appointed acting midshipman in the navy. From the 10th Congressional District of New York. Entered the third class.
1859. June 9, graduated as midshipman.
1859–61. Frigate *Congress*. Brazil station.
1861. August 31, promoted to lieutenant.
Converted steamer *James Adger* for ten days.
1861–2. Steam corvette *Pocahontas*, South Atlantic Blockading Squadron.
1862–3. Naval Academy, then at Newport, Rhode Island. First lieutenant of the *Macedonian* during the summer practice cruise to Europe in 1863.

1863–4. *Seminole*, West Gulf Blockading Squadron.
1864–5. *James Adger;* on staff of Rear Admiral Dahlgren; *James Adger.*
1865–6. Double-ender *Muscoota.*
1865. June 7, promoted to lieutenant commander.
1866. Ordnance duty, Washington Navy Yard.
1867–9. Steam sloop *Iroquois,* Asiatic station.
1869. Commanding gunboat *Aroostook.* Asiatic station.
1870–1. Navy yard, New York.
1871. Worcester, home station.
1872. Receiving ship, New York.
Nov. 20, promoted to commander.
1873–4. Commanding side-wheeler steamer *Wasp* in the river "Plate."
1875–6. Navy yard, Boston.
1877–80. Naval Academy.
1880–3. Navy yard, New York.
1883–5. Commanding steam sloop *Wachusett,* South Pacific Squadron.
1885. Naval War College, as lecturer on Naval History and Strategy.
Sept. 23, promoted to captain.
1886–9. President Naval War College.
1889–92. Special duty, Bureau of Navigation.
1892–3. President Naval War College.
1893–5. Commanding *Chicago.* European station.
1895–6. Special duty in connection with Naval War College.
1896. Nov. 17, retired as captain on his own application after 40 years' service.
1896–1912. Special duty in connection with Naval War College.
1898. Naval War Board.
1906. June 29, rear admiral on the retired list.
1909. Delegate to Hague convention.
1914. Dec. 1, died at the Naval Hospital, Washington.

ACADEMIC HONORS

1894. D. C. L., Oxford.
LL. D., Cambridge.
1895. LL. D., Harvard.
1897. LL. D., Yale.
1900. LL. D., Columbia.
1909. LL. D., McGill.

Member of the American Academy of Arts and Letters, of the National Institute of Arts and Letters and of the American Historical Association.

PUBLISHED WORKS

1883. The Gulf and Inland Waters.
1890. The Influence of Sea Power on History.
1892. The Influence of Sea Power on the French Revolution and Empire. 2 vols.
The Life of Admiral Farragut.

1897. The Life of Nelson. 2 vols.
The Interest of America in Sea Power.
1899. Lessons of the War with Spain.
1900. Problems of Asia.
The South African War.
Types of Naval Officers.
1902. Retrospect and Prospect.
1905. Sea Power in its Relations to the War of 1812. 2 vols.
1907. Some Neglected Aspects of War.
From Sail to Steam.
1908. Naval Administration and Warfare.
1909. The Harvest Within.
1910. The Interest of America in International Conditions.
1912. Armaments and Arbitration.
1913. Major Operations of the Navies in the War of American Independence.

A FEW TRIBUTES OUT OF MANY FROM VARIED SOURCES

1. His former clerk, the ships' writer of the *Wachusett,* writes: "I loved and revered him as a father."

2. The American Historical Association, in a letter of condolence to his widow, says: "Admiral Mahan was a frequent attendant at the annual meetings of the council. There are many of us who regarded the opportunity of meeting and hearing him, both at the business sessions and at the customary council dinner, as one of the notable privileges associated with membership in the council."

3. At a meeting of the trustees of the American Church Institute for Negroes, held at the Diocesan Home, the board in a formal resolution expressed "their sense of the very great loss they have sustained in the death of Rear Admiral Mahan. He was always most deeply interested in the work of the Institute and was one of the most regular attendants at its meetings. His counsel and advice were always greatly prized and it will be difficult if not impossible to find anyone to fill his place."

4. Admiral Sir Bouverie Clark, R. N., states that "it has always been a source of pride to me to be able to say I had the friendship of so distinguished a man."

5. After eulogizing Mahan's work in the Institute for Negroes, Bishop Greer, of the Diocese of New York, continues: "Let me add how much the advice and counsel of your honored husband meant to me, not only in the work of the Institute but in many other relations of life. I shared with all the world the admiration for his eminent services in his chosen profession, and yet, beyond and above all that, I admired him for the beauty and charm of his Christian character."

6. In a resolution of sympathy for his family the board of managers of the Seamen's Church Institute remark: "His deep interest in all matters which concerned the good of seamen and his unfailing and unselfish service in their interest will be gratefully remembered by all who had the privilege of working with him."

7. Mr. Henry M. Upham gives this picture of Mahan, when, as lieutenant commander, he joined the *Muscoota*, "to which I was attached with the modest rank of acting master's mate. He was then, as always, a striking looking man. . . . . He was most kind to me, helping me in the study of navigation and in every other way. . . . . The world is richer for his having lived and poorer for his having passed from it."

8. Nor is the appreciation of his character and labors confined to his contemporaries. A young man, Mr. Frederick P. Keppel—in spite of his youth, dean of the College of Columbia University—thus speaks: "How much has gone out of the lives of the younger men who knew your husband! We counted his friendship, not only as a great honor and privilege, but as a great personal pleasure. I do not know of any man, distinguished or unknown to the world, whose friendship meant more to the men of the younger generation."

9. At this moment it is too early to have received kindred expressions from abroad. That they will come shortly in large numbers and from all corners of the earth cannot be doubted. In the meantime the British Ambassador in Washington is moved to say: "It is my duty on behalf of the British Admiralty to express the sorrow British sailors feel at the death of your husband."

10. Resolution passed at a meeting of the Council of the Navy Records Society, December, 1914: "The Council of the Navy Records Society desire to offer to the family of the late Admiral Mahan a sincere expression of sympathy and to record their sense of the loss the British Empire has sustained by the termination of the career of one who so generously appreciated the real work of the Royal Navy."

Although other countries, besides our own, and other navies profited by the insight and knowledge with which he drew and discovered the great conclusions of naval history, the British service is his chief debtor. The achievements of our sailors were his theme and their consequences his doctrine. There is probably no officer in any of the battle fleets and squadrons now serving all over the world who has not been and is not now being encouraged and instructed by the truths he taught about sea power.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SHIPS OF THE UNITED STATES NAVY

AN HISTORICAL RECORD OF THOSE NOW IN SERVICE AND OF THEIR PREDECESSORS OF THE SAME NAME

1776–1915

By ROBERT W. NEESER

NEW YORK

NEW YORK.—One of the United States. It was first visited by Sebastian Cabot in 1497, and colonized by the Dutch East India Company in 1609, from whom it was captured by the British in 1664. The state joined the union in 1776, and ratified the Constitution in 1778. The city of New York is the largest and most important trade center in North America. It is situated on Manhattan Island, which was discovered by Hendrik Hudson in 1609. The Dutch founded a colony here in 1631, and called it the settlement of New Amsterdam, but in 1664 Richard Nicholls took possession of it in the name of the Duke of York, when it received its present name.

The *New York* is an armored steel battleship of the first class, known to-day as a super-dreadnought. She is one of the two ships authorized by Congress on June 24, 1910, and was built by the government at the New York navy yard, where she was launched on October 30, 1912. She is a ship of 27,000 tons displacement, and has the following dimensions: length, 565 feet; breadth, 95 feet 2 inches; draft, 28 feet 6 inches. Her engines are of the quadruple expansion type and she has Babcock and Wilcox boilers. Her estimated speed is 21 knots, and she has a bunker coal capacity of 2850 tons, exclusive of 400 tons of oil. Her armor is of Krupp steel, which protects her water-line in an 8-foot wide belt, varying in thickness from 12 inches amidships to 4 inches at the ends; in addition she has 9-inch to 11-inch armored bulkheads forward and aft, 14-inch plates on her turrets, 12-inch barbettes, and 6 inches on her battery and casemates. Her armament consists of ten 14-inch B. L. R.'s, twenty-one 5-inch R. F.'s, four 3-pound-

ers, two 1-pounders, two 3-inch field guns, and two .30-caliber machine guns. She also has two 21-inch submerged torpedo tubes. Her complement is, as flagship, 63 officers and 1009 men. The contract cost of her construction was $6,000,000.

On April 15, 1914, the *New York* went into commission at the New York navy yard, whence, on April 26, in command of Captain Thomas S. Rodgers, she sailed for Mexican waters, where she became the flagship of Rear Admiral C. McR. Winslow, commanding the special service squadron. After several months' duty at Vera Cruz, the *New York* returned to home waters, where she was assigned to the first division of the Atlantic fleet, being, for a time, Admiral Fletcher's fleet flagship.

The armored cruiser *New York,* now known as the *Saratoga,* was the fifth ship of that name. Authorized by Act of Congress on September 7, 1888, she was launched at the shipyard of William Cramp & Sons, Philadelphia, Pa., on December 2, 1891. She is a ship of the first rate, of 8150 tons displacement, 380 feet 6 inches length, 64 feet 10 inches breadth, and 23 feet 3 inches draft. She is an armored steel vessel, with a water-line belt 4 inches thick, a 6-inch sloping protective deck, 5½ inches of steel on her turrets, and a barbette of 10 inches. Her engines are of the vertical triple-expansion type, of 17,075 H. P., and on her trial developed a speed of 21 knots. She has Scotch boilers, and a bunker coal capacity of 1325 tons. Her original contract cost was $2,985,000. Her complement is 34 officers and 525 men.

When first commissioned, in 1893, the *New York* carried a battery of six 8-inch B. L. R.'s, twelve 4-inch R. F. G.'s, eight 6-pounder D. S.'s, and four Hotchkiss 1-pounders. This armament remained substantially the same for 13 years, with the exception of occasional changes in her secondary 1-pounder battery, which was more than doubled in 1897 and 1898, and afterwards gradually decreased. In 1906 her armament was changed to four 8-inch B. L. R.'s, ten 5-inch R. F.'s, eight 3-inch R. F.'s, four 3-pounder R. F.'s, and four .30 caliber automatics.

On August 1, 1893, the *New York* went into commission at Philadelphia under Captain J. W. Philip, and proceeded immediately to the South Atlantic station where she was engaged in protecting American interests until June 29, 1894, when she was ordered north for duty in home waters with the North Atlantic

squadron. On August 23, 1894, Captain R. D. Evans relieved Captain Philip. The *New York* then became the flagship of the North Atlantic station, and cruised regularly with the squadron, except in June, 1895, when she was ordered to Kiel, Germany, for the opening of the new North Baltic Sea canal. Returning to the United States, Captain Evans was succeeded in command of the *New York* by Captain W. S. Schley, who in turn was relieved by Captains S. Casey (March 14, 1897)* and French E. Chadwick (1897).

The 15th of February, 1898, found the *New York* at Dry Tortugas, Fla. Immediately the ship proceeded to Key West, where she was fitted for war service, and on March 26 became the flagship of Rear Admiral W. T. Sampson. Three days after the declaration of hostilities, she sailed for the Havana blockade and while on that station, on April 27, shelled some new Spanish defences at Matanzas, Cuba, with the *Puritan* and *Cincinnati.* Four days later Key West was visited for coal, and then, in company with the *Indiana* and *Iowa,* two monitors and two cruisers, Admiral Sampson sailed for San Juan, Porto Rico, where, after many difficulties, owing to the necessity of towing the monitors, the squadron arrived on the 12th, and proceeded to bombard the defences. The surprise was complete; it was eight minutes before there was an answering shot. But two hours' firing by the ships did comparatively little damage to the forts, and the vessels withdrew having been struck three times.

On May 21, the *New York* arrived on the north coast blockading station, whence she cruised in the early part of June between Key West and Santiago, arriving off the latter port in time to participate in the bombardments of the Spanish forts on June 6 and 16. On July 1, the *New York* went with the *Gloucester* and *Suwanee* to Aguadores to make a demonstration in cooperation with a detachment of the army, and on the day following the flagship and the fleet bombarded Morro Castle and the Socapa battery at Santiago to cover an assault by the American troops, which, however, did not take place.

A few minutes before 9 a. m. on July 3, the *New York* left her station on the blockade for Siboney where Admiral Sampson was to consult with General Shafter. At 9.35 the smoke of a gun at

* Dates in parentheses, immediately following an officer's name, indicate the date of his taking command of the ship.

the Santiago harbor entrance interrupted her eastward progress. In another moment the Spanish ships were seen coming out. The *New York's* helm was immediately put hard over and the engineer's department was urged to exert every effort to make steam. But, at 9.35 the ship was seven miles from Morro Castle, and the distance was too great to lessen rapidly. Still, the presence of the *New York* towards the close of the chase, when she and the *Oregon, Brooklyn* and *Texas* were rapidly overhauling the *Cristobal Colon* did much to bring the last fleeing Spanish cruiser to bay. After this engagement the *New York* participated in but one more action, the bombardment of the batteries at Santiago on July 11. On August 20 the ship steamed up the Hudson River, New York.

On December 12, 1899, Captain A. S. Snow took command of the *New York,* which still was attached to the North Atlantic squadron. But under Captains M. R. S. Mackenzie (February 16, 1901) and J. J. Hunker (January 3, 1903) she was the flagship of the Pacific station, performing various duties, and, in February-March, 1903, proceeded to the coast of Honduras for the protection of American interests. Returning to the Atlantic coast, the ship was, on March 31, 1905, placed out of commission at the Boston, Mass., navy yard. Four years later, the *New York* was again placed in commission (May 15, 1909), in command of Captain Spencer S. Wood, and proceeded to the Mediterranean with the armored cruiser squadron, where she cruised during the winter of 1908-1909, and, on her return, was assigned again to the North Atlantic fleet (August, 1909), remaining until December 31, 1909, when she was placed in first reserve. On being recommissioned (April 1, 1910), the *New York* proceeded to the Asiatic station, under Commander J. L. Jayne (March 16, 1910), where she became the flagship of the commander-in-chief of that fleet. On February 16, 1911, the name of the *New York* was changed to the *Saratoga,* in order that the newest battleship authorized by Congress might bear the name of the empire state.

The fourth *New York* was, until May 15, 1869, known as the *Ontario.* Like her predecessor, the third *New York,* she never was completed. She was built by the government at the New York navy yard, her keel being laid in 1863. She was one of the first rate screw sloops authorized by Congress during the war, of 3177

tons tonnage, 312 feet 6 inches length, and 47 feet breadth. Her engines were of the horizontal back action type, of 36 inches stroke, and were built by the Etna Iron Works of New York at a cost of $385,000. She had four main and two super-heating boilers. Her proposed battery (December 9, 1864) was two 30-pounder Parrott rifles, one 60-pounder Parrott, two 100-pounder Parrotts, sixteen 9-inch smooth-bores, two 24-pounder howitzers, one 12-pounder rifle, and one 12-pounder smooth-bore. The *New York* was carried on the Navy Register until 1888, when she was broken up on the stocks.

The third *New York* was a sailing ship-of-the-line, one of the vessels authorized by the Act of April 29, 1816. She was a ship of 2633 tons, built of wood, and of the following dimensions: length, 196 feet 3 inches; breadth, 53 feet; depth, 22 feet. Her armament (assigned in 1850) was to consist of twelve 8-inch smooth-bores, and seventy-two long 32-pounders, and she was to be manned by 820 men. She was built at the Norfolk, Va., navy yard by the government at a cost of $215,328.76, but never completed. Her keel was laid in 1818, and she was still on the stocks on April 20, 1861, when the navy yard was burnt. What was left of her was sold on May 31, 1888, at New York to C. H. Gregory for $10.

The second *New York* was a frigate of 36 guns, built, on the outbreak of the war with France, with money advanced by citizens on the credit of the United States under authority of the Act of June 30, 1798. She was launched at New York in 1799, and carried 38 officers and 340 men. Her initial cost was $159,639.

On October 20, 1800, she was ordered to the Guadeloupe station, under the command of Captain Richard V. Morris, where she made an uneventful cruise for the protection of American commerce with Commodore Barry's squadron. At the close of hostilities, in the spring of 1801, the *New York* was laid up at Washington.

The outbreak of the war with Tripoli brought the *New York* into service again, and she was put into commission on August 13, 1802, by Captain James Barron, who had as his first lieutenant Stephen Decatur. Proceeding to the Mediterranean, Captain Barron first touched at Algiers, where he delivered to the Ameri-

can consul $30,000, which our government hoped the Dey would accept as tribute in lieu of naval stores, after which the *New York* put into Port Mahon to refit, arriving later at Gibraltar. On April 6, 1803, Commodore R. V. Morris, commanding the squadron, shifted his flag to the *New York,* taking with him Captain Isaac Chauncey, while Captain Barron went to the *Chesapeake.*

An unfortunate accident on board, shortly after, during the passage of the ship from Gibraltar to Malta, nearly ended in disaster. Through carelessness, a quantity of powder was exploded in the vicinity of the magazine. Bulkheads were blown down and the ship was on fire and full of smoke below. Nineteen officers and men were injured. But perfect discipline prevailed, and volunteers, headed by Captain Chauncey, succeeded in putting out the fire. Arriving at Malta May 1, 1803, the *New York* was detained repairing the damage done by the explosion. Putting to sea again in the latter part of May the commodore proceeded to blockade Tripoli, off which port one day a number of coasting vessels were chased and forced to put into the harbor of the Old Town. An attack was made by the boats of the American squadron under Lieutenant Porter in the face of a hot fire from a large force of troops on shore, and all the stranded vessels were fired, but the Tripolitans, with reckless courage, rushed out from behind their breastworks, put out the flames and saved their shipping, besides inflicting a loss of fifteen killed and wounded on the landing party.

On May 28 the squadron made an attack on the Tripolitan gunboats off the Bashaw's capital, but the *New York* was unable to participate owing to the lightness of the wind, and Commodore Morris was in consequence charged with mismanagement. In fact, this bombardment concluded Morris's offensive campaign against the Tripolitans. On June 10 he sailed away with the *New York* and *Enterprise,* leaving two frigates on blockade off the port, and these, after their capture of the Tripolitan frigate *Meshuda,* he also withdrew to collect his whole forces at Naples. In September, 1803, Commodore Morris was recalled by the Navy Department, and Commodore John Rodgers hoisted his broad pennant in the *New York,* but as Commodore Preble was already on his way to relieve him, the *New York* did not see much more service in Mediterranean waters. A short visit to Tangier—where the Sultan of Morrocco was so impressed by the force of the

American squadron that he declared only most friendly sentiments and made all haste to confirm the treaty of 1786—and Commodore Rodgers, with the *John Adams* in company, set sail October 19, 1803, for the United States, where the *New York* was laid up at Washington. When the War of 1812 broke out, she was reported as unworthy of repair; in 1814 she was a sheer hulk, and in that condition (August, 1814) she was burnt to prevent capture by the British troops that occupied the capital.

The first *New York* was a gondola constructed by the American troops on Lake Champlain in the summer of 1776 in their efforts to establish a flotilla on that waterway to dispute the British advance from Canada against Ticonderoga. She was built at Skenesborough, N. Y., of forest timber, and mounted one long 12-pounder, two nines, and eight swivels. Her crew consisted of 45 men.

Under Captain Reed, the *New York* formed part of General Benedict Arnold's flotilla. Leaving Crown Point on August 24, the vessel cruised about the lake, stopping first at Willsborough, then at Isle la Motte, and lastly at Valcour Island, where Arnold took up an excellent defensive position with his small force to await the coming of the British flotilla under Captain Pringle. He had not long to wait. On the 1st of October news of the enemy's approach was received and 11 days later his ship, schooners, and smaller vessels were sighted rounding Cumberland Head. In the action that followed, the American vessels suffered severely. Two were lost and the others were so hulled and shattered that Arnold decided to abandon his position and retreat to the shelter of Crown Point. On this first day of action the *New York* lost every one of her officers except her captain, and expended three-fourths of her ammunition.

The flotilla's withdrawal was successfully accomplished, and on the morning of the 12th Arnold reached Schuyler's Island, 12 miles away, stopping there only to stop leaks and mend sails. But the delay was sufficient to enable the British to overtake the fleeing Americans. One by one Arnold's vessels were forced to run ashore or surrender. The former was the fate of the *New York*. On October 13 she was beached, after a running fight, and burnt to prevent falling into the hands of the enemy.

TEXAS

TEXAS.—The largest of the United States. The first European who landed on this part of the continent was the French explorer La Salle, in 1685. Originally part of Mexico, it had many settlers from the United States, who, oppressed by the Mexican Government, formed themselves into a republic in 1835. In 1845 Texas renounced its independence and joined the union.

The *Texas* is a sister-ship of the *New York*, having been authorized by same Act of Congress, June 24, 1910, and having been built from the same plans. She is an armored steel battleship of the first rate, of 27,000 tons. Her length is 565 feet, her breadth, 95 feet 2 inches, and she draws 28½ feet of water. Her engines are of the quadruple expansion type, developing a speed, on trial, of 21.05 knots. Her bunker capacity is 2850 tons of coal, exclusive of 400 tons of oil. She was built by contract at the yard of the Newport News Shipbuilding Co., at a cost of $6,000,000, and was launched on May 18, 1912. Her armament consists of ten 14-inch B. L. R.'s, twenty-one 5-inch R. F.'s, four 3-pounders, two S. A. 1-pounders, two field guns, two machine guns, and four submerged 21-inch torpedo tubes. Her complement, as flagship, is 63 officers and 1009 men.

On March 12, 1914, the *Texas* was commissioned at the Norfolk navy yard, and 12 days later she put to sea, under the command of Captain Albert W. Grant, for special service in Mexican waters. Arriving at Vera Cruz she was attached to Rear Admiral C. McR. Winslow's squadron. On her return north in the summer of 1914, she was assigned to the first division of the Atlantic fleet, which is her present duty.

The previous *Texas* was one of the fist two modern armor-clad ships built for the new navy. She and the *Maine* were provided for in the Act of Congress of August 3, 1886. The *Texas* was the second ship in our navy to bear that name. She was built by the government, from plans drawn by the Barrow Shipbuilding Co. of England, at the Norfolk navy yard, and was there launched on June 28, 1892. Her principal dimensions were: displacement, 6315 tons; length, 301 feet 4 inches; breadth, 64 feet 1 inch; draft, 22 feet 6 inches. Her engines were of the vertical triple-expansion type of 8610 H. P., and her four boilers were double-ended Scotch. Her speed was 17.8 knots, and with 850 tons of coal in her bunkers her steaming radius at 10 knots was 2900 miles. She had a water-

line belt of 12 inches of armor, while added protection was given to her vitals by a 2-inch sloping protective deck. On her turrets were 12-inch steel plates. Her battery, in 1895, consisted of two 12-inch B. L. R.'s, six 6-inch B. L. R.'s, twelve 6-pounders, six 1-pounders, four 37-mm. Hotchkiss revolvers, two Colts, one field gun, and two Whitehead torpedo tubes. Her complement was 30 officers and 478 men.

On August 15, 1895, the *Texas* went into commission at the Norfolk navy yard, and on the 6th of the month following she went out for her preliminary trials. Her first commanding officer was Captain H. Glass. From January 26 to July 20, 1896, she was out of commission at the Norfolk navy yard, but the remainder of the time she was attached to the North Atlantic station. Captain W. C. Wise relieved Captain Glass on March 31, 1897, and he in turn was succeeded by Captain John W. Philip on October 18, 1897.

On the outbreak of the Spanish-American War the *Texas* formed part of the flying squadron. On May 19, she proceeded to Cienfuegos, thence to Santiago, and from that place to Guantanamo Bay. Her station from June 11 to 30, was, judging from her movements, on the blockade between Morro Castle and Guantanamo Bay, which, after the occupation of McCalla Hill by the marines on June 10 to 14, became the general base of the American fleet for coaling and repairs; the *Vulcan*, a repair ship, having been ordered there for the use of the fleet. The only warlike operations at Guantanamo Bay after this, except for a reconnoissance a few days later, were the attack made by the *Texas* on June 15, on the small and antiquated fort commanding the approach to Caimanera, the chief result of this maneuver being the bringing to the surface of two Spanish contact mines—one of them broken adrift by the propeller of the *Texas*, the explosion of which would probably have destroyed the ship.

On four different occasions the *Texas* participated in the bombardments of the Spanish forts at the entrance of Santiago harbor, on June 6 and 16, and on July 2, and on the night of July 4-5. On June 22, while the American army, under General Shafter, was landing at Daiquiri, the *Texas* participated in the diversion against the Socapa battery and was struck by one Spanish shell, which killed one man and wounded eight others.

When the Spanish fleet, under Admiral Cervera, came out of Santiago harbor, the *Texas* was on her station directly before Morro Castle. "The first shots of the *Texas,*" wrote Captain Philip, "were directed at the *Teresa* at long range (4200 yards) . . . . Every one of the Spanish vessels fired as she came broadside on, rounding the western point of the harbor entrance. . . . . I altered the *Texas's* course to the westward, seeing that was the direction in which the Spanish squadron was going. Then occurred the incident which caused me more alarm than anything Cervera did that day. As the *Texas* veered westward, the *Brooklyn* was ploughing up the water at a great rate in a course almost due north, direct for the oncoming Spanish ships, and nearly a mile away from the *Texas.* The smoke from our guns began to hang so heavily and densely over the ship that for a few minutes we could see nothing. Suddenly a whiff of breeze and a lull in the firing lifted the pall, and there, bearing towards us and across our bows, turning on her port helm, was the *Brooklyn.* . . . . 'Back both engines hard,' went down the tube to the astonished engineers. . . . . The collision which seemed imminent, even if it was not, was averted."

The *Maria Teresa* was now standing along the coast; and two other Spanish cruisers had by this time also made their exit. At 10.30 the *Teresa* headed for the shore, a towering mass of smoke. After the other fleeing cruisers, the American fleet raced. The *Texas* warmly engaged the *Oquendo,* which was the last to come out, firing from her main battery guns only when a good target could be seen, for the smoke from her own guns hung so heavily about the ship, that, "often for minutes at a time, for all we could see, we might as well have been down in the double bottoms as on the bridge." And the secondary battery was also brought into play when the Spanish destroyers made their appearance. At 10.35 the *Texas* passed the *Oquendo* as that ship ran up the white flag. Leaving her, Captain Philip continued the chase after the *Vizcaya* and the *Colon,* which were still crowding on all steam. But shortly after 11 the first named veered toward the shore, on fire fore and aft. At noon the *Colon* was steaming 14¼ knots, but the *Texas* dogged her heels, making 95.2 turns on her port engine, about 13.8 knots—almost as much as the speedy *New York* which, at that hour, was making but 13.92 knots. But at 12.50, the *Oregon's*

13-inch turret-guns found the range of the gallant *Colon,* four and a quarter miles away, and the chase was won.

Thanks to the fact that the range at which the action was fought was shorter than that expected by the Spaniards, the American ships escaped with slight injury. The *Texas* was struck but once and had four men wounded, but she suffered other damage from the effect of the concussion of her own 12-inch guns.

After the war, Captain Philip was relieved in command of the *Texas* by Captain Charles D. Sigsbee (September 4, 1898). From this time on the ship cruised with the North Atlantic fleet, participating in the usual fleet evolutions, target practices, etc., until she went out of commission at Norfolk on November 3, 1900. Previous to this Captain Sigsbee had been relieved by Captain W. S. Gibson (January 22, 1900), who in turn was succeeded in command by Captain M. R. S. Mackenzie.

On November 3, 1902, the *Texas* was again put in commission as flagship of the coast squadron of the North Atlantic fleet. Her commanders during this period were Captain William T. Swinburne and Captain George A. Bicknell (1904). Under Commander Charles F. Plunkett (June 26, 1906), the ship remained at the Norfolk navy yard in reserve. In September she again went into full commission under Commander George R. Clark (August 25, 1906), and conveyed a force of marines to Cuba to reinforce the army of occupation, after which she returned to reserve duty at Norfolk on November 9, 1906, remaining there, in charge of Commander Clark and Lieutenant Commander Edward T. Witherspoon (August 17, 1907), until she was placed out of commission on January 11, 1908.

There being a need for a station and receiving ship at Charleston, S. C., the *Texas* was put in service for that duty on September 1, 1908. Her commanding officers from 1908 until 1911 were Commander William A. Gill, Lieutenant William H. Allen (July 29, 1910) and Commander Albert W. Key (September 26, 1910). On February 3, 1911, her name was changed to the *San Marcos,* under which name she continued in service until October 11, 1911, when she was stricken from the Navy Register.

The first *Texas* was an ironclad ram captured from the Confederates at the fall of Richmond, Va., on April 4, 1865, and taken by Admiral Porter " for the use of the navy." She was a ship

of the first rate, built of wood and iron, at an estimated cost of $126,848. Her dimensions were: length, 217 feet; breadth, 48 feet 6 inches; depth, 13 feet; and draft, 13 feet 6 inches. She had twin screws, and four horizontal direct-acting engines of 20 inches stroke, and two return-flue boilers. She was sold at Norfolk, Va., on October 15, 1867, to J. N. Leonard for $3200.

ARKANSAS

ARKANSAS.—One of the Southern states of the union, on the Mississippi River. First settled by the French in 1685, it formed part of the Louisiana purchase in 1803, and was admitted into the union in 1836.

The battleship *Arkansas* now in service is the third ship of the navy to bear the name of the State of Arkansas. She is a ship of the first line, of 26,000 tons (normal displacement), 554 feet length, 93 feet 2½ inches breadth, and 28 feet 6 inches draft. Built by contract under authority of the Act of Congress of March 3, 1909, at Camden, N. J., by the New York Shipbuilding Co., at a cost of $4,675,000, she was launched on January 14, 1911. Her propelling machinery consists of four-screw Parsons turbines, for which steam is furnished by Babcock and Wilcox boilers. Her trial speed was 21.05 knots. Her main battery includes twelve 12-inch B. L. R.'s, while for secondary defence purposes she is armed with twenty-one 5-inch rifles, four 3-pounders, two 1 pounders, two 3-inch field pieces, and two .30-caliber M. She has also four 21-inch torpedo tubes. Her complement is, as flagship, 62 officers and 978 men.

On September 17, 1912, the *Arkansas* went into commission, under the command of Captain Roy C. Smith, at the Philadelphia navy yard, whence she immediately proceeded to New York for the October naval review. After a shaking-down cruise, she received the President on board for passage to the Panama Canal (December, 1912). In June, 1913, she joined the first division of the Atlantic fleet, performing, for a time, duty as escort to the Brazilian battleship *Minas Geraes*. In November she went to the Mediterranean with the fleet. From July to December, 1914, the *Arkansas* was engaged in the usual fleet maneuvers, drills and target practices, during one of which she achieved the distinction of establishing a world's record with one of her 12-inch turrets, making a perfect score at 2000 yards with both guns in six shots fired in 57 seconds.

In April, 1914, the *Arkansas* became the flagship of the commander-in-chief, Rear Admiral Charles J. Badger. Two weeks later, while preparing for target practice, the ship was suddenly ordered to Mexican waters in company with such of the ships of the Atlantic fleet as were immediately available. At 1 o'clock on the morning of the 22d she arrived in Vera Cruz. The bluejackets and marines of the *Florida* and *Utah* had already been landed, but were not in sufficient force to maintain their positions. So the *Arkansas's* landing force of 18 officers and 328 men was at once called away and put ashore in time to participate in the second day's fighting, losing two men killed and three wounded. On April 27, the American flag was officially raised over the city of Vera Cruz and the *Arkansas's* battalion remained on shore until relieved by the army on April 30.

For several months longer the *Arkansas* remained at Vera Cruz with the other ships of the Atlantic fleet, returning in the fall to her home yard at New York, where Captain William R. Shoemaker succeeded Captain Smith in command of the ship.

The present *Arkansas's* predecessor was one of the single-turret harbor-defence monitors authorized by Congress on May 4, 1898, just after the outbreak of the Spanish-American War. She is still in service, as the *Ozark*, her name having been changed on March 2, 1909, in order that one of the new battleships might bear the name. She is a steel vessel of 3225 tons displacement, having the following dimensions: length, 252 feet; breadth, 50 feet; draft, 12 feet 6 inches. Her rig is one military mast and she has one funnel. She was built by contract for $960,000, by the Newport News Shipbuilding Co., and was launched on November 10, 1900. She is a twin-screw ship, with two vertical triple-expansion engines, of 1830 H. P., and 24-inch stroke, to which steam is supplied by four Thornycroft boilers. Her trial speed was 12.71 knots, and her coal bunker capacity is 344 tons, sufficient to enable her to steam about 1680 miles at 10 knots.

Built for harbor defence, the *Arkansas* was planned along the lines of the monitors constructed at the close of the Civil War, only her armament was considerably reduced, and she carries only two 12-inch B. L. R.'s mounted in a forward turret, while for a secondary battery she was furnished with four 4-inch R. F.'s, eleven 1-pounders, and two .30-caliber automatic rifles. Her

armor protection consists of a water-line belt 11 inches thick, with from 9 to 11 inches on her turrets and barbettes. Her complement is 13 officers and 209 men.

Commissioned on October 28, 1902, the *Arkansas* formed part of the coast squadron of the North Atlantic station. Her first commanding officer was Commander C. E. Vreeland, under whom she sailed from Norfolk on December 3, 1902, making a cruise for the instruction of the midshipmen from the Naval Academy. On October 27, 1904, Commander R. H. Galt assumed command of the ship on the same station, participating in the joint army and navy maneuvers of that summer, and making, besides, several cruises with the midshipmen, and finally, on September 2 to 4, 1906, attending the presidential review at Oyster Bay, L. I. Arriving at Annapolis, Md., on September 6, 1906, the *Arkansas* was placed in reserve on September 11. Commander Bradley A. Fiske, on November 22, 1906, succeeded Commander Galt in command, and under him the *Arkansas* made a cruise with the midshipmen from June 4 to August 31, 1907, when she again went into reserve. Under Commander Harry M. Dombaugh (August 29, 1907), the ship was again commissioned for the same purpose on June 1, 1908, being finally placed in reserve, on her return to the Naval Academy, on September 1, 1908.

The first *Arkansas* was a 752-ton wooden steamer purchased at Philadelphia from S. & J. W. Flanagan by Commodore C. K. Stribling in 1863 for $98,000. Her original name was the *Tonawanda*. She was a single-screw vessel of the third rate, with a barkentine rig. Her length was 191 feet, her breadth 30 feet, and her depth 19 feet. She had one vertical condensing engine, of 30 inches stroke, and a bunker capacity of 400 tons of coal. Her trial speed was 15 knots. On September 4, 1863, her armament consisted of four 32-pounders of 33 cwt., and one rifled 12-pounder, to which, on October 9, was added one 20-pounder Parrott rifle, and on June 21, 1865, still another 20-pounder. Her complement was 13 officers and 75 men.

The *Arkansas* was commissioned at Philadelphia on September 5, 1863, in charge of Act. Vol. Lieut. D. Cate, and attached to the West Gulf blockading squadron where she performed continuous service as supply-, dispatch-, and transport-vessel. On September 27, 1864, she captured the schooner *Watchful*, and this,

with the exception of several bales of cotton picked up off the Texas coast on March 28, 1864, was the only prize she made. In June, 1864, she went on the ways at Algiers, La., in charge of Act. Ensign F. H. Beers, and on coming off met with an accident, whereby she became very much hogged and developed such serious structural weaknesses that during May, 1865, she was obliged to remain at New Orleans for repairs. On July 13, 1864, Act. Vol. Lieut. J. F. Harden took command of the ship until Lieutenant Cate relieved him on August 30, when the *Arkansas* resumed her duties on the station. After the war, the vessel proceeded to the Portsmouth, N. H., navy yard, under Act. Vol. Lieut. N. Kirby (May 21, 1865), where she went out of commission on June 30, 1865. On July 20, 1865, she was sold at Portsmouth to G. S. Leach for $40,100.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE ACTION BETWEEN THE *PRINCE OF NEUFCHATEL* AND THE *ENDYMION*

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October 10, 1914, marks the centenary of an obscure sea-fight in the War of 1812 which deserves better than its present fate of being forgotten. This was the encounter between the American privateer *Prince of Neufchatel* and a boat expedition from the British frigate *Endymion,* which took place off the southeast knuckle of Nantucket Island. Coggeshall, in the appendix to his history of American privateers, gives interesting details of the fight based on documents supplied by members of the privateer captain's family. Maclay's account, in his work on the privateers, follows this story in the main, but differs from it in several important particulars.

For the following narrative the writer has made use of further material supplied by letters from Nantucket contemporaries published in the *Nantucket Mirror and Inquirer,* memoranda in an old scrap-book preserved in the Nantucket Athenæum, and a long transcript from the *Neufchatel's* log, published in the *Boston Advertiser* for October 17 and 18, 1814. These sources correct certain points in Coggeshall and Maclay, and offer some fresh material, especially on the incidents immediately following the action itself. As the story is now one of the cherished traditions of Nantucket, one would naturally expect to find full details in a history of the island written by a contemporary, Obed Macy, and published in 1835. Unfortunately for historical purposes, Macy was a Quaker, and after a bare statement of the facts he dismisses the affair with the following comment: "We forbear to state the particulars of this sanguinary engagement, believing it would neither please nor edify a large part of our readers." However, there is ample material in the other sources, and of these it would seem that the most trustworthy is the log of the *Neufchatel* herself.

According to this, the *Prince of Neufchatel* was a privateer brig of 311 tons and 14 guns, registered in New York. She began her cruise in March, 1814, and was remarkably successful. On July 4 she left Cherbourg for her homeward voyage. On her way she made a leisurely commerce-destroying cruise in the English Channel and the Irish Sea, which netted her 15 prizes, most of which were burnt or scuttled. On September 6 she captured the ship *Douglass,* of 429 tons, bound from Demerara for Liverpool with a rich cargo of rum, sugar, cotton and coffee.

The two vessels kept company across the Atlantic. Early on the afternoon of October 10, with the south shore of Nantucket bearing north about half a mile, Captain Ordronaux of the *Neufchatel* sighted a frigate off Gay Head, which proved to be the *Endymion.* (In the log, the above date is given as the 11th, and Coggeshall, Maclay and others have written October 11 ever since. Nantucket accounts, however, agree that the date should be the 10th, and one of the correspondents, in writing to the *Mirror and Inquirer,* explains that the confusion of dates is due to the common practice, at the time, of beginning a new entry in the log at noon of each day and assigning it the date of the following day. Oddly enough, the British accounts say October 9.[1])

As soon as the *Endymion* sighted the privateer, she gave chase, and had the benefit of a fresh breeze, while the *Neufchatel* lay becalmed. At three o'clock the breeze struck the limp sails of the brig, and she got under way, towing the *Douglass.* At that time the frigate was hull down about 12 miles away to the southwest.

As the privateer was short-handed, Ordronaux took on several men from the island who had rowed out to offer their services, among them a pilot. About sundown the breeze fell again, and at seven o'clock the brig was obliged to come to anchor close to the shore, at a spot "abreast of Maddequecham Pond," about half way between the present life-saving station and the bluffs of "Tom Never's Head." The *Endymion* also lay becalmed, but some hours before she had put out her boats to capture the privateer and her prize.

Ordronaux had sighted this boat expedition before sundown, and made preparations to defend his ship. He slushed her sides and stretched boarding nettings. As he had taken a large supply of small arms from his prizes, he distributed piles of loaded

[1] Maclay, "A History of American Privateers," p. 380.

muskets along the bulwarks, together with baskets filled with loaded pistols. He double-shotted his guns, ramming home 12-pound bags of musket balls to serve as grape, and filled the lockers with round shot to drop overboard through the bottoms of the boats.

Shortly after eight o'clock a signal lantern on the *Douglass* warned him that the enemy were at hand, but it was already so dark that, although oars could be heard, nothing could be seen of the boats themselves till about an hour later, only a few moments before the attack was made. The British had five barges, containing, according to the privateer's log, "104 souls," and according to other accounts anywhere between that number and 146 officers and men. The attack was conducted with great skill by the *Endymion's* first lieutenant, who was in command. The boats deployed under cover of darkness, then, at the same instant, grappled with the brig on both sides and at the bow and stern. The first lieutenant himself sprang to the bows of the vessel shouting, "Follow me, the prize is ours!" The next instant he fell back mortally wounded.

Opposed to the British were about 35 men on the deck of the privateer. The exact number is hard to ascertain. Coggeshall says 33; the log of the *Neufchatel* records 38, and yet its subsequent tally of killed, wounded and unhurt after the battle, totals only 35. Below decks were 37 prisoners, who, as soon as the action began, tried every means to get free, and throughout the fighting shouted encouragement to their compatriots.

The defenders were a motley collection of nationalities. Captain Ordronaux himself was a Frenchman, who had already distinguished himself as the commander of a French privateer. He is described as of squat, almost dwarfish figure, with a repulsive face, but a first-class seaman and a veritable demon in battle. The first mate was a Swede, and several different languages were spoken before the mast; but, wherever they hailed from, these "American" privateersmen gave a good account of themselves.

A moment after the boats were sighted, a savage hand-to-hand fight began on all sides of the brig. According to the privateer's log, this fight lasted 20 minutes; a Nantucket version makes it 35. At the end of that time the boats alongside cried for quarter, but Coggeshall declares that the men from the two boats under the privateer's bows managed to get a foothold on the forecastle and

threatened to capture the ship. At that moment Ordronaux succeeded in slewing round one of his broadside guns and training it on the advancing enemy. An instant later a charge of canister and musket balls swept the entire forecastle clear, carrying away friend and foe together.

In contradiction to this story is the testimony of a Nantucket contemporary, who says that it was commonly reported the following day that during the fight not a single Englishman succeeded in getting a foothold on the deck. The log says merely that "the enemy were repulsed in every attempt to board."

This forecastle episode is not in Maclay's narrative, but he supplies an incident not to be found in Coggeshall's. "At one period of the fight," he says, "when the British had gained the deck and were driving the Americans back, Ordronaux seized a lighted match, ran to the companionway, directly over the magazine, and called out to his men that he would blow up the ship if they retreated further. The threat had the desired effect, the Americans rallied for a final struggle, overpowered the enemy, and drove the few survivors into the boats." I have found no hint of this melodramatic incident anywhere else in the accounts of the battle.

A "prominent citizen" of Nantucket used to relate a story which he said was told him by an officer of the *Endymion* who was sent as a prisoner to Nantucket. This officer was in command of a boat containing 20 men, and attempted to board the brig at the bows over the cable. He himself managed to get upon the bows alone, but his boat got adrift in the strong tidal current, so that his crew were unable to follow and he unable to return. Finding himself in this awkward predicament, with the fight raging all around on both sides of the ship, he made his way aft, passing through the lines of defenders unobserved, although he was in full uniform. When he arrived at the taffrail of the brig "he saw his own boat drifting out by the counter, without a single living soul in it!" Presumably it was not long afterwards that he surrendered, but the story ends at that point.

An ancient mariner of Nantucket, who in 1873 contributed to the *Inquirer and Mirror* his reminiscences of the fight, expresses grave doubt concerning the above incident. "It may be true," he remarks in his letter to the paper, "but I cannot quite hoist it in."

At all events, one can be certain of at least 20 minutes of the most ferocious and desperate fighting at hand grips raging on all sides of the ship. The situation at the end of that time is thus described in the *Neufchatel's* log: "One launch, having on board 48 men, was sunk and only two men saved; one which had 36 men on board at the commencement of the action was taken possession of—she had eight men killed, 20 wounded and eight unhurt. The other three drifted from alongside the brig with the current, without a man to be seen in them (supposed they must have been killed or wounded). We had not a boat to go after them, and had only eight men not killed or wounded." The loss of the privateer is given as six killed, including the Nantucket pilot, 15 severely wounded, six slightly, and eight unhurt. Of these eight it is said that all who could report for duty were listed as "unhurt." On the British side the losses are given as 33 killed, 37 wounded, and 30 prisoners. (To this number Coggeshall adds "11 missing.") Among the killed were the *Endymion's* first lieutenant, and one master's mate; the wounded included the third lieutenant, two master's mates and one midshipman. It is said that the only boat to return to the frigate was the one containing the surgeon and his assistants.

Captain Ordronaux's difficulties were by no means ended when the survivors of the attacking party cried for quarter. With only eight of his men fit for duty, he did not dare to take the prisoners aboard that night; and having removed their small arms and oars, he kept all but the surviving officers lying alongside in their launch till morning. Meanwhile, throughout the night, he and his first mate Mellen kept guard at each hatchway over the other prisoners. Ordronaux himself was wounded, but neither he nor anyone else could get medical attention that night, for the ship's surgeon was himself too badly hurt to be of service. So all night long, as Coggeshall puts it, the wounded, "with mingled sounds of groans and curses . . . . were wallowing about the deck."

The following morning Ordronaux hung a sail abaft the main hatches to conceal the quarter-deck. Behind this screen he stationed two boys, one beating a drum, the other blowing a fife, and both stamping loudly to give the impression that there was a heavy force drawn up to enforce orders. Then he put six of his crew into a boat, and, having first taken parole of his prisoners for fear the British might be in control at Nantucket, he sent 67 of the

Englishmen ashore, along with his own seriously wounded. Of the enemy's wounded two died in the boat; others died later in the village of Sesacacha, where the landing was made. At that time Sesacacha was a thriving fishermen's hamlet of 30 or 40 houses, but not a trace of it remains to-day.

Those of the wounded who were considered equal to the trip were huddled into carts with the other prisoners and were dragged over eight miles of sandy road to Nantucket town, where they arrived in every stage of suffering. Most of these wounded men were laid out on the tavern floor, where, apparently in the presence of as many men and boys as could crowd in to look on, a surgeon probed for the musket balls in the merciless fashion of the day.

Ordronaux turned over his prisoners to the United States marshal, but as he suspected, the island was completely under British control. Like the rest of New England, Nantucket had at best only a lukewarm interest in the war, and on account of its exposed position the island suffered more than any other section. Earlier in the same year, Nantucket citizens had been obliged to bind themselves, by an agreement with Admiral Cochrane, that they would be neutral in "the war between his Britannic Majesty and the United States." Under this agreement the British admiral permitted the islanders to get food and firewood from the mainland and, under certain restrictions, to take fish.

Soon after the fight, a contemporary writes, "an officer came to take charge of the prisoners, having impressed a mail packet for the purpose." Another citizen writes of being present "when the English officers visited the prisoners"; so it is evident that the *Endymion* sent an expedition to recover her men. This is confirmed by the fact that when, on the 31st of the month, the *Endymion* fell in with the *Saturn*, bound for Halifax, the former sent on board 28 wounded officers and men and received, to replace her losses, one lieutenant, four midshipmen and 33 seamen and marines.

All accounts of the action quote Captain Hope of the *Endymion* as saying that he had lost as many men as if he "had been engaged with a frigate of equal size." Whether he actually said so or not, the fact is beyond question. In attempting to take the privateer, the *Endymion* lost a hundred men in killed, wounded and prisoners. In her running fight with the 44-gun frigate *President*, three

months later, the *Endymion* lost a total of only 25 killed and wounded.

The remarkable thing about the *Endymion's* movements after her encounter with the *Neufchatel* is that she apparently made no further effort to capture the privateer. The following day the frigate sailed across the sound to "Tarpaulin Cove," now Vineyard Haven. The *Neufchatel,* after landing prisoners and wounded, stood over to Holmes's Hole, where she remained three days. Ordronaux was compelled to impress some half dozen of his prisoners to get a crew large enough to man his vessel, and he is said to have remarked in fine Gascon style that it was only the lack of men that kept him from going over to Tarpaulin Cove and capturing the *Endymion* where she lay. Meanwhile the Englishman remained unconcernedly at anchor.

On the morning of the 14th Ordronaux made sail and, though he passed in plain view of the *Endymion,* he went on his way unmolested and arrived safely in Boston on the morning of the 15th. There he discharged 20 prisoners and "a full cargo of goods, consisting of 140 bales, 160 boxes, and 158 trunks of dry goods, 23 casks and 174 boxes of sweet oil, a quantity of coffee and rum," etc. The following day nine bodies were brought ashore for burial.

As he sailed past Nantucket on his way to Boston, Ordronaux was surprised to see his prize, the *Douglass,* fast aground off the village of Sesacacha. The fate of the *Douglass* makes an amusing sequel to the story of the fight. The citizens of Nantucket had little zeal for a war that brought them nothing but ruin, and the federal government at Washington must have seemed very remote and foreign. Even to-day an old Nantucketer will speak of going to the mainland as crossing to "America." Furthermore, a large proportion of the islanders were Quakers, opposed to war on principle. But even the Quakers were not averse to such of the benefits of war as a kindly Providence cast in their path. To a community impoverished by the war, the *Douglass,* with her rich cargo, must have looked like manna in the wilderness. At any rate, after the *Neufchatel* had gone on her way, word was craftily conveyed to the master of the prize that another British boat party had been sighted coming toward her. Knowing that he could not resist, and anxious to save the cargo, the prize-master ran the *Douglass* upon a shoal near the beach, exactly as the natives had

intended that he should. A tackle was promptly rigged to the edge of the bluff, and hundreds of willing hands helped to land the cargo. Later, under cover of night, the same willing hands removed the cargo farther inland. Every cart on the island was pressed into service to carry off the loot, and little was left for the prize-master the following morning. This performance was generally excused, says a Nantucket contemporary, on the ground that it was "all privateering."

The subsequent career of the *Prince of Neufchatel* was brief. She ran the blockade out of Boston, but was captured on December 28 by Admiral Collier's squadron, which was searching for the *Constitution*, and her spectacular career came to an end.

The defence of the privateer against the boats of the *Endymion* suggests comparison with the similar and better-known exploit of another privateer brig, the *General Armstrong*, in the harbor of Horta a month before. Like the *Neufchatel*, the *Armstrong* was attacked at night by a large force of the enemy in boats, and succeeded in beating them off. The *Armstrong*, however, had the advantage of bright moonlight, which enabled her to use her broadside and swivel guns on the boats before they closed. Unquestionably, too, the *Armstrong* had miraculous luck in losing only seven wounded and two killed out of a total of 90 officers and men. At the end of the *Neufchatel's* fight, as we have seen, she had only eight men fit for duty. In the sequel, too, the *Neufchatel* scores better than the *Armstrong*, for the latter had to be scuttled and burnt to prevent her capture, whereas the *Neufchatel* made good her escape. It must be remembered also, to Captain Ordronaux's credit, that he accomplished a remarkable feat in getting safely rid of his numerous prisoners the morning after the fight.

The defence of the *General Armstrong* brought her commander, Captain Reid, a captain's commission in the navy. As far as the records go, there seems to have been no particular notice taken of Captain Ordronaux, except that there was a movement started in Boston to present him with a sword, which he promptly discouraged. Coggeshall's estimate of the action is that, "under all the circumstances, it was the hardest-fought naval engagement and the most conspicuous victory achieved during the war." One may hesitate to go the full extent of this emphatic statement, but it is not too much to say that Ordronaux's defence of the *Prince of Neufchatel* deserves a place in history with the most stubborn and desperate sea-fights of the War of 1812.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE UNITED STATES NAVY IN MEXICO 1821–1914

By Louis N. Feipel

CHAPTER I

Operations of the West India and Pacific Squadrons, 1821–1841

Ever since the Spanish-American colonies wrested their independence from the mother country in the early decades of the 19th century, the American Navy has been called upon to be prepared to uphold our honor and dignity among them. The series of revolutions by which the independence of these colonies was achieved, necessarily produced a serious interference with the regular course of commerce, and this consequence the United States quickly and keenly felt.

The hindrance to commercial intercourse arose from two distinct sources, namely, the establishment of blockades by the belligerents, and the ravages of pirates. The right of belligerents to blockade each other's ports, our government never disputed; but in vindication of the rights of neutrals, it maintained that the blockade should be actual and effectual, *i. e.*, that an adequate naval force should be present to enforce it and to render it hazardous for a merchant vessel to disregard it. Spain, unable to enforce a strict blockade, sought nevertheless to establish one along an extended line of seaboard by mere proclamation. This paper blockade naturally damaged our shipping interests, inasmuch as vessels relying upon the American doctrine on the subject, disregarded a proclamation which was not supported by an actual and adequate force. The Spanish cruisers and privateers, though unable to prevent this practice by effectually guarding the proscribed ports, were able occasionally to capture an American ship which had broken this paper blockade, and were even in the habit of making captures on the mere suspicion of such an intention.

It became necessary, therefore, for our government to order to the West Indies a squadron capable of preventing such proceedings against our commerce, and of showing its continued determination to resist the application of this loose principle of blockade. The display of our naval force, sustaining the reasoning of our diplomatic protests, was fully successful in accomplishing the object in view. Our doctrine was finally admitted by the Spanish authorities, and American merchantmen were soon pursuing their course again regardless of imaginary blockades.

The matter of piracy, however, involved evils which were not so easily managed and remedied. The unsettled state of affairs, internal revolutions, feeble governments, a low state of morality in the surrounding communities, and the debasing influence of war —all conspired to foster a system of piratical enterprises, whose head and center was located in the West Indies and the Gulf of Mexico. It is unnecessary to describe the details of this dark and destructive system. Suffice it to say that repeated reports of such outrages, committed on our very borders, during times of peace, soon awakened not only the fears but the indignation of our countrymen. Merchant ships were armed to some extent, and in some instances successfully repelled the attacks of pirates. But this was insufficient. The government was called upon to afford protection, and promptly responded to the call.

The first accounts of piracies were received in the United States in the fall of 1821, just after the independence of Mexico had been declared; and the United States immediately took measures to capture and bring to punishment the offenders. The sloop-of-war *Hornet,* brigs *Enterprise* and *Spark,* and schooners *Shark, Porpoise,* and *Grampus,* with three gun-boats, were ordered to sail directly on this service. The labors of this squadron were, for the most part, confined to the West Indies; but the coast of Mexico also provided a theater of operation. Thus, the mere appearance of the *Enterprise* at Galveston, under Lieutenant Lawrence Kearny, in 1821, served to break up the piratical establishment which had been set up in that place by the notorious Jean Lafitte. This freebooter, after abandoning his rendezvous at Galveston, shifted his cruising-ground to the southern coast of the Gulf, made the Island of Margarita (near the Orinoco) a place of rendezvous, and finally ended his days in Sisal, Yucatan, in 1826.

Early in the year 1823, a more formidable squadron was fitted out and placed under the command of Commodore David Porter. The squadron rendezvoused at Thompson's Island (now Key West), whence expeditions were regularly despatched in various directions, including the coast of Mexico. The *Grampus,* Lieutenant Commandant Francis H. Gregory, cruised along the coast from Vera Cruz to Campeachy, and fell in with several piratical vessels. One vessel was chased on shore, where she was abandoned by her crew, who escaped; and another was turned over to the authorities at Campeachy. Later in the year, Lieutenant Commandant John T. Ritchie, in the schooner *Fox,* proceeded to the coast of Yucatan, but found no traces of pirates there. In January, 1824, the *Shark* was despatched on a cruise in the neighborhood of Vera Cruz, Tampico, and Alvarado, for the protection of our commerce there. In April of the same year, Commander Jesse Wilkinson, of the steam galliot *Sea Gull,* reported the departure of the celebrated pirate Diableto from Cuba, bound to Yucatan; and Lieutenant Commandant John H. Lee, with the schooners *Jackall* and *Wild Cat,* was despatched in pursuit of him, but without success. In October, Lieutenant Commandant John Gallagher, in the *Shark,* cruised along the coast from Tampico to Yucatan, but likewise without sighting any pirates. By such vigorous measures, piracy along the Mexican coast was very soon suppressed; but it lingered for some years longer in other parts of the Caribbean Sea.

Our first minister to Mexico was the Hon. Joel R. Poinsett, who was appointed in 1822. Mr. Poinsett sailed from Charleston on the 28th of August, 1822, in the sloop-of-war *John Adams;* and after touching at Porto Rico, he entered the port of Vera Cruz on the 18th of October following. On the way to Vera Cruz, the *John Adams* gave chase to a brig which had been mistaken for a pirate. Midshipman David G. Farragut was sent in a boat to board the stranger, when she proved to be a Spanish man-of-war. After landing in Vera Cruz, Poinsett proceeded on his journey to the City of Mexico, while the *John Adams* sailed for Tampico, taking on board some specie and an old Spaniard who had been 19 years engaged in surveying that coast. It was during this cruise that Farragut acquired his first knowledge of the treacherous Gulf coast, a knowledge that proved of such great service to him in after life. At Tampico, 30 Americans,

who had been released from prison in the City of Mexico through the influence of Poinsett, were taken on board the *John Adams*, and conveyed to the United States. The vessel, with Mr. Poinsett as passenger, returned to Norfolk about the 1st of December, the same year.[1]

In 1825, Mr. Poinsett was again accredited minister to Mexico, and proceeded to Vera Cruz on board the frigate *Constellation*, of the West India Squadron. About this time, too, the commanding officer of the Pacific Squadron began sending vessels on occasional cruises along the west coast of Mexico and California, for the protection of our commercial interests. The chief interest of our navy in Mexico, however, continued to be centered on the east coast.

The Mexican Navy itself was being gradually increased, until in January, 1827, it consisted of one ship-of-the-line, two frigates, a sloop, four brigs, and some smaller vessels. In 1826, Commodore David Porter, who had resigned from the United States Navy and had entered the service of Mexico, was appointed "General of Marine." In November, 1827, he issued a proclamation, inviting those who were so disposed to fit out privateers to cruise against the enemies of Mexico, and to apply to him for commissions. He ordered, at the same time, that every vessel on board of which might be found effects of the enemy, should be conducted to Vera Cruz for condemnation or acquittal. Our commanding officer, however, at once adopted effective means to avoid the evil likely to result from this cause; and the treaty subsequently formed with Mexico, by adopting more liberal principles, relieved us from apprehended inconveniences. In 1828, the commanders of two of the Mexican vessels attempted to use the port of Key West as a place of rendezvous for making depredations upon Spanish commerce, but were soon made to depart by Master Commandant George Budd, of the sloop-of-war *Natchez*.

The sloop-of-war *Hornet*, Master Commandant Alexander Claxton, paid a visit to Vera Cruz in 1828, and finding the country in a very unsettled state, was requested to remain and protect the persons and property of the American merchants. Afterwards, the *Hornet* proceeded to Tampico, where likewise there

[1] The results of Poinsett's observations during this visit were published by him in 1824, in a volume entitled, "Notes on Mexico made in the Autumn of 1822; by a Citizen of the United States" (Phila., Carey & Lea).

existed a reign of terror. At the strong and repeated solicitation of our consul at that place, Claxton was induced to receive on board all the specie belonging to our countrymen, amounting to not quite $40,000, which he conveyed safely to Pensacola.

In 1829, a Spanish expedition invaded Mexico. Apprehending that our commerce in that quarter would suffer by the encroachments of the belligerents, the Navy Department fitted out the sloop-of-war *Peacock*, and despatched her to the scene under Commodore Jesse D. Elliott, as commander of the West India Squadron. While before Vera Cruz in November of that year, Elliott learned that an outrage had been committed by two Mexican gun-boats upon the brig *Ajax*, an American vessel, while lying in the harbor of Sisal, on the coast of Campeachy. He immediately despatched the sloop-of-war *Erie*, under the command of Master Commandant David Conner, to Sisal, to inquire into the case and to demand not only redress, but security for the future. Shortly after this, he learned that an American seaman had been impressed from the ship *Virginia*, of New York, while she was lying in the harbor of Vera Cruz, by order of Admiral Lopez, commander of the Mexican naval forces in that port. He at once addressed a letter on the subject to Lopez, requesting such an explanation of the matter as would amount to a redress of the wrong, and an assurance that there would not be a recurrence of the same. To this request, Admiral Lopez generously acceded.

Toward the close of the year 1829, Congress passed an act authorizing the employment of some additional force in the West Indies in consequence of the invasion of Mexico by an armament from the island of Cuba. (Stat. at Large, IV, 370.) In conformity with the provisions of this act, the frigate *Brandywine* was equipped and despatched to the coast of Mexico under the command of Captain Henry E. Ballard. The *Brandywine* cruised in the vicinity of Mexico for several months; and by this timely means, whatever danger threatened our trade in that quarter was most effectually parried.

In July, 1831, the schooner *Grampus* appeared off the mouth of the river Brazos, on the coast of Texas, to observe the movements of the Mexican squadron which was operating against that state, then in revolt against Mexico. And although the Mexican men-of-war at this time and place gave no occasion for armed intervention on our part, the presence of the *Grampus* was instru-

mental in saving an American vessel which got on shore among the breakers, and which, but for this timely assistance, would inevitably have gone to pieces.

In August of the following year, while the *Grampus* was again at anchor off the Texan coast, an American vessel arrived, whose captain reported to Lieutenant Josiah Tattnall, commanding the *Grampus,* that the Mexican war-schooner *Montezuma* had overhauled and boarded her at sea. He further stated that the Mexican captain had treated him and his crew most shamefully, and had robbed his vessel of many valuable articles. The *Grampus* got under way immediately, and began beating up for Tampico bar, the *Montezuma* being 60 miles to windward and having a start of 24 hours. Notwithstanding this handicap, however, the *Grampus* reached Tampico bar two days ahead of the Mexican vessel, and captured her within gunshot of another vessel of the same nationality and of equal force, and in full view of the Mexican forts. This seizure of the *Montezuma* was made by Tattnall without special instructions from the Navy Department, and wholly on his own initiative.

After landing her prisoners at Pensacola, the *Grampus* returned to Tampico. The Mexicans were there detaining an American vessel, which had taken on board $200,000 in specie for transportation to the United States. Anxious to seize the money, the authorities sought a pretext for holding the vessel; and pending the maturing of their rascally proceedings, the vessel was anchored under the guns of the Mexican fort, in charge of officers of the customs. Learning the facts of the case, Lieutenant Tattnall proceeded in his boats over the bar, took the vessel from the hands of the Mexicans, brought her out, and convoyed her beyond the reach of the Mexican cruisers.

In the same year (1832), Commodore Elliott, in the sloop-of-war *Fairfield,* proceeded to Tampico, where he was applied to by three persons, Spaniards by birth, but citizens of the United States, for protection against a proclamation issued by Brigadier General Moctezuma, the military commandant of the place. It seems the Mexican government had ordered all native Spaniards to quit Mexican territory within a certain number of days; and in pursuance of this decree, General Moctezuma issued his proclamation, commanding all such persons to quit Tampico in 15 days from the date of publication. The persons in question were inhab-

itants of Florida, and subjects of Spain, when that territory was ceded to the United States, and afterwards took out formal certificates of naturalization. By the treaty of April 5, 1831, concluded between the United States of America and the United Mexican States, the citizens of each were secured from molestation by the other while pursuing their lawful business. Upon the application of these persons, therefore, to Commodore Elliott, he immediately addressed a letter to General Moctezuma, setting forth the reasons which exempted them from his proclamation, and claiming for them the immunity secured to them by the treaty of 1831. Moctezuma replied that the treaty, not having been officially communicated to him, could not be recognized by him as a law of Mexico. Commodore Elliott again addressed him, repeating his claim and sending Moctezuma a copy of the treaty. At the same time, he addressed a letter to our consul at Tampico, informing him of the facts and requesting him to communicate to the persons aggrieved that Lieutenant William Boerum, commanding the schooner *Shark,* was instructed to wait off Tampico during 24 hours to receive them on board and transport them to Pensacola or to the mouth of the Mississippi, if General Moctezuma should insist on their expulsion. He also wrote to our chargé d'affaires at Mexico, requesting him to cause the treaty to be officially communicated to General Moctezuma. The proclamation of the general, however, was insisted upon, and Commodore Elliott not being able to use force (his ship being prevented by a dangerous bar from approaching Tampico nearer than within 12 miles), these citizens were received on board the *Shark* and transported to the United States.

In April, 1836, Commodore Alexander J. Dallas, who had relieved Commodore Elliott of the command of the West India Squadron, despatched the revenue cutter *Jefferson,* acting with the squadron, to Tampico and the coast of Mexico. On the 3d of May, the *Jefferson* anchored off Tampico. Lieutenant Thomas Osborn, going on shore to communicate with our consul, was, together with his boat's crew, seized and imprisoned by the Mexican authorities, and the vessel was prohibited from entering the river. A demand for satisfaction, made by the American consul, was haughtily refused. The *Jefferson* left the port, but communicated with the schooner *Grampus,* which came to off the bar; and on the following day, a sloop-of-war belonging to the squadron

arrived and anchored in the same place. Lieutenant James M. McIntosh, commanding the *Grampus,* directed a note to the principal of the port, informing him that, by order of Commodore Dallas, he had come to enter into a correspondence with him relative to the insult which had been inflicted on the American flag. A note followed from the Foreign Department of the Mexican government to Powhatan Ellis, American chargé d'affaires at Mexico, requesting him to interpose his authority and order our vessels to retire. Mr. Ellis very properly declined to do so. In a few days, an official communication apprised Mr. Ellis that the Mexican government had supplanted the officer in command at Tampico, and that a summary investigation had been ordered to be instituted with a view to punishing that individual as he deserved. Mr. Ellis, being thereupon again requested to order the withdrawal of our squadron from Tampico, did so, and the vessels accordingly departed. Shortly afterwards, however, the officer whose punishment had been promised as an atonement for the insult to the American flag, was recalled into the Mexican service and assigned to a command upon the coast, where his hostile feelings might again endanger the security of American citizens and property.

The effect of this open withdrawal of the apology was, as might have been anticipated, soon made to appear in a fresh outrage upon a part of the crew of one of our national vessels. The sloop-of-war *Natchez,* under the command of Master Commandant William Mervine, arrived at the port of Vera Cruz on the 25th of October, 1836, and came to anchor, as usual, near the Island of Sacrificios. On the following day, the customary civilities of friendly powers were interchanged. On the 2d of November, a boat from the *Natchez,* in charge of Passed Midshipman Francis B. Renshaw, arrived at the "muelle" (or mole), bearing a letter from Commander Mervine to the American consul. In order to deliver this letter, Renshaw left the boat for a few minutes, and in his absence the men found means to procure liquor. They soon became more or less intoxicated, and a dispute arose between one of them and a fisherman, which resulted in a personal conflict. The guard stationed at the gate, perceiving what had taken place, rushed down and attacked the seamen, and at the point of the bayonet drove a part of them into the boat, leaving two upon the ground severely wounded. Midshipman Renshaw arrived soon

after the disturbance began, and did all in his power to quell it. In this he came near being struck by the bayonets of the soldiery; and even after the men had been driven into the boat, muskets were leveled at them. But the captain of the port, perceiving the intention of the soldiers to fire, ordered them to desist. The consul, being sent for, found two seamen on the mole weltering in blood, both badly wounded, and the other six in the boat, all more or less injured. The men were all too much overcome with liquor to enable the boat to return to the ship, on account of the high wind. Midshipman Renshaw and the consul, therefore, determined to have them placed in the guardhouse, where they could receive medical treatment and remain until sober. The captain of the port was accordingly requested to take charge of them, which he did, at the same time ordering the two that were most injured to be conveyed to the hospital.

At an early hour next morning, an officer arrived from the *Natchez,* bearing a letter from Commander Mervine, addressed to the commandant of marine at that place, expressing his regret at the occurrence of the previous day, and assuring the commandant that, on an investigation of the affair, if it should appear that the boat's crew were the aggressors in the case, they should receive condign punishment. This letter, being presented, was read and returned to Commander Mervine, together with an oral message from General Vasquez, the then military commandant of the state, to whom Mervine's letter had been referred by the Marine Department.

An application was next made by the consul to the captain of the port for the release of the seamen. The answer was returned that, an order having been issued from superior authority to detain them, the captain of the port regretted not having it in his power to comply with the consul's request. The consul thereupon waited on the military commandant general, who informed him that the seamen had outraged the laws of the Mexican republic and had assaulted the military guard at the mole, for which offence the penalty, by the criminal code of Mexico, was a sentence to at least six years hard labor in the public streets, and to which the seamen would be condemned, should the charges be substantiated. The liberation of the men was refused accordingly. Commander Mervine now addressed a note to the above-mentioned authority, protesting against the detention of the seamen, and demanding

their liberation. But his note being disregarded, he left for Pensacola to report the matter to Commodore Dallas. For 20 days these seamen remained confined in a humid and loathsome prison on a short allowance of food, and all communication with them was precluded our consul. Finally, on the 25th of November, they were released and turned over to the consulate, where they were retained subject to the orders of Commodore Dallas.

On December 27, 1836, Minister Ellis left the City of Mexico, joined the sloop-of-war *Boston* at Vera Cruz, and reached Washington about the beginning of January, 1837. He brought with him full information of his fruitless negotiations with the Mexican government for redress of grievances. This was immediately followed by a violent outburst from President Jackson. The amicable tone of his former annual messages to Congress was changed for language of a different tenor in the special message which he sent to Congress on February 6, 1837. In this message he suggested, as an alternative to a declaration of war, the use of the naval forces of the United States to enforce our claims, in case Mexico should refuse an amicable adjustment upon another demand being made from on board a naval vessel. Congress, however, was not ready to adopt strong measures, contenting itself merely with accepting the more conciliatory reports of the Committees on Foreign Affairs of both Houses.

When the war which Texas was then waging with Mexico culminated in the decisive victory of the Texans at San Jacinto and the capture of Santa Anna, the authorities of Texas, embarrassed by the presence of their distinguished captive, and fearing his assassination, turned him over to our government. It was at once resolved, however, to send him back to Mexico, and the brig-of-war *Pioneer,* Lieutenant Commandant Josiah Tattnall, was selected in 1837 to perform this mission. Santa Anna and his principal aid—General Almonte—having been received on board, the *Pioneer* set sail from Norfolk for Vera Cruz. On her arrival, the news quickly spread that the former President of Mexico was on board and would soon land. Crowds collected on the mole, and several regiments were soon formed in the vicinity. The city was astir with excitement. As Santa Anna was about to leave the ship, Lieutenant Tattnall, in full uniform, took him by the arm and said: "General, I will see you to your hotel." As they stepped from the barge upon the wharf, there ensued a profound

silence in the multitude which had lately been so vociferous. A change appeared to have come over their thoughts and purposes. A salute was given, the bands struck up, and the colors flew out amid enthusiastic vivas from soldiers, citizens, and rabble. General Almonte afterwards stated that the uniform and companionship of Lieutenant Tattnall, and the fearlessness of the entire proceeding, saved Santa Anna from calamity, and compassed the wonderful revulsion of sentiment in the populace. Tattnall himself was lionized in Vera Cruz. He remained several days with Santa Anna, until all likelihood of opposition had subsided, and then returned with his ship to Norfolk.

Meanwhile, the Mexican squadron had captured two American schooners engaged in conveying contraband goods to the Texans, and had taken them into Matamoros. The American sloop-of-war *Natchez,* Commander William Mervine, soon appeared, and on the 16th of April, 1837, made a prize of the Mexican brig-of-war *General Urrea.* This occurrence produced great excitement. Fire was opened on the *Natchez* from the port and from the Mexican man-of-war *General Bravo,* and all American vessels in the port were seized and detained by the Mexican authorities. The *General Urrea* was conveyed to Pensacola, but the President of the United States soon ordered her to be restored to the Mexican government. This duty fell to the lot of Commander Thomas Crabb, of the sloop-of-war *Vandalia,* who executed it to the satisfaction of all concerned.

Later, on the 24th of June, in the same year, the West India Squadron, consisting of one frigate and four sloops-of-war, under Commodore Dallas, called at Vera Cruz, and the commodore demanded of Castro, the commandant general, an assurance, such as had been given him by General Filisola at Matamoros, that there should be no more attempts against American merchantmen; otherwise he would adopt efficacious means to deprive the Mexican squadron of the means of annoying American commerce. General Castro, without manifesting a hostile spirit, replied that neither he nor General Filisola could give such assurances, as that belonged exclusively to the province of the supreme government. Dallas then wrote back on the 28th, saying that he would leave on the Mexican coast a sufficient naval force to protect American commercial interests from future Mexican aggressions.

During the brief war between France and Mexico, from 1838

to 1839, our squadron, besides affording protection to our commerce, was an interested spectator of the blockade of Vera Cruz and the bombardment of the castle of San Juan de Ulloa. Prior to the bombardment, Commander David G. Farragut, in the sloop-of-war *Erie,* embarked the American residents of Vera Cruz, and after the castle was blown up, and quiet had been restored, set them safely on shore again.

In May, 1839, Powhatan Ellis, who had again been appointed minister to Mexico, took passage in the frigate *Constitution* for Vera Cruz. The *Constitution* then proceeded to her station on the Pacific coast, where she became the flagship of Commodore Claxton. From this time on, vessels of the Pacific Squadron were regularly detailed to cruise in the Gulf of California and along the northwest coast of America, for the general protection of our commercial interests. In 1841, this duty was assigned to the sloop-of-war *St. Louis,* Commander French Forrest. This vessel happened to arrive at Monterey just about the time that certain atrocities were being committed on American and British residents by the Mexican authorities. Under the unfounded pretense of a conspiracy among the foreigners to wrest the country from Mexico, and to set up a separate and independent government of their own, these residents had been attacked by armed soldiers in the night, wounded, beaten, imprisoned, sent in chains to a distant place, and their property destroyed. Commander Forrest, however, by his prompt and spirited interposition, vindicated and secured the rights not only of American citizens, but of British subjects also. For these services, he received a formal expression of the thanks of both American and British residents. The resulting claims of the Americans remained pending for a long time, however, the visit of Commodore John H. Aulick, in the *Yorktown,* in November, 1841, not being able to accomplish anything.

In the meantime, the South Sea Surveying and Exploring Expedition, under the command of Lieutenant Charles Wilkes, which had left Norfolk in the fall of 1838, had reached the northwest coast of America in the prosecution of its peaceful mission. The surveys in the vicinity of Oregon being completed, the sloop-of-war *Vincennes* proceeded to San Francisco, to survey that harbor and the Sacramento River. A party was also despatched overland, to proceed down the same river and rejoin their vessel at San Francisco. This party was conducted by Lieutenant George F.

Emmons over a difficult route and through hostile tribes of Indians. Meanwhile, the boats of the *Vincennes* sailed up the Sacramento River, visiting points which had never before been examined. Upon the completion of these surveys, the expedition left San Francisco and pursued its course across the Pacific.

CHAPTER II

COMMODORE JONES AT MONTEREY, AND OTHER OPERATIONS, 1842–1845

In the year 1842, Commodore Thomas Ap Catesby Jones was appointed to the command of our naval forces in the Pacific. During the latter part of the summer of that year, he was lying in the port of Callao, with the flagship *United States,* the sloop-of-war *Dale,* and the schooner *Shark.* While there, he received a Mexican newspaper containing a manifesto from the Mexican government respecting the relations between that country and the United States, from which he concluded that war probably existed between the two countries. In an American newspaper he also found a report to the effect that Great Britain had succeeded in making a purchase of California from Mexico. Commodore Jones's suspicions were further aroused by the strong British squadron which was then concentrated in that part of the Pacific.

There can be little doubt that Jones had been put upon the alert by our government. The question of the annexation of Texas, then in agitation, had given unusual interest and prominence to Mexican affairs, and in the event of a war between the two countries, it was manifestly the policy of the United States to seize California. To Jones it seemed quite likely that the British admiral was intending to take formal possession of that territory, and he deemed it his duty to forestall or resist him in any such plan. He consequently set sail suddenly from Callao on the 7th of September, 1842, with the entire squadron, standing out to the westward. The *Shark* and the *Dale* were soon detached upon special service; but previous to the separation of the *Dale,* a council of officers, consisting of Captain James Armstrong of the *United States,* Commander Cornelius K. Stribling of the *Cyane,* and Commander Thomas A. Dornin of the *Dale,* was called by Commodore Jones, for the purpose of giving their advice as to the proper course to be pursued.

The decision of this council on the main question proposed was, that "in case the United States and Mexico are at war, it would be our bounden duty to possess ourselves of every point and port in California which we could take and defend without much embarrassment to our operations on the ocean," and that "we should consider the military occupation of the Californias by any European power, but more particularly by our great commercial rival, England, and especially at this particular juncture, as a measure so decidedly hostile to the true interest of the United States, as not only to warrant our so doing, but to make it our duty to forestall the design of Admiral Thomas, if possible, by supplanting the Mexican flag by that of the United States, at Monterey, San Francisco, and any other tenable points within the territory said to have been recently ceded by secret treaty to Great Britain." The *United States* and *Cyane* then proceeded to the northward, crowding all sail for the coast of Mexico. While on the way, Commodore Jones, in writing to the Secretary of the Navy, after alluding to the fact of having received no communication since his sailing orders of nine months previous, said: "In all that I may do, I shall confine myself strictly to what I may suppose would be your views and orders, had you the means of communicating them to me."

Rounding Point Pinos at dawn of the 19th of October, Jones hoisted British colors, and at noon boarded a Mexican vessel coming out of Monterey harbor, the master of which professed not to have heard of any hostilities between Mexico and the United States. Approaching the town with the captured vessel, the *United States* and the *Cyane,* with the Stars and Stripes flying, anchored at 2.45 p. m. as close to the castillo as the depth of the water would permit. After what seemed a long delay, two Californian officers approached in a boat, but seemed so nervous and reserved as to excite suspicion, though they declared that no news had been received of war. An officer of the American ship *Fama,* lying at anchor in the harbor, being summoned, stated that reports of war were current at Honolulu, and that he had heard the report that Great Britain was to take possession of the country. Moreover, a general stir was noticeable on shore, with signs of preparation for defense; and it was deemed a suspicious circumstance that no Americans came on board from the town.

"The time for action had now arrived," says Jones. "Whilst nothing had occurred to shake my belief in the certainty of hostilities with Mexico, the reiterated rumored cession of California to England was strengthened by what I have already related. Hence no time was to be lost, as another day might bring Admiral Thomas with a superior force to take possession in the name of his sovereign; General Micheltorena, or the new Governor-General of California, might appear to defend his capital, within less than three days' march of which he was then said to be. If I took possession of the country and held it by right of conquest in war, and there was war with Mexico, all would be right; then if the English should come and claim under a treaty of cession, as such treaties do not give title till possession is had, I should have established a legal claim for my country to the conquered territory, and at least have placed her on strong grounds for forcible *retention* or amicable negotiations, as after circumstances might dictate. If Admiral Thomas should afterwards arrive and attempt to supplant our flag on shore, the marines of the squadron to man the guns of the fort without weakening our ships would insure us the victory, and the responsibility would rest on the English commander. On the other hand, if it should turn out that amicable relations had been restored between the United States and Mexico, that Mexico had not parted with the Californias, and that at the time I demanded and took possession of Monterey there was no war, the responsibility of the act at first might seem to rest on me, certainly not on our government, who gave no orders upon the subject. But if I am right (of which there can be little doubt) in assigning to Mexico the attitude of a nation having declared conditional war, then, under all the circumstances of the case, Mexico is the aggressor, and as such is responsible for all evils and consequences resulting from the hostile and menacing position in which she placed herself on the fourth of June last. But I may be wrong, *toto coelo*, in all my deductions and conclusions. If so, I may forfeit my commission and all that I have acquired in seven and thirty years' devotion to my country's service. Terrible as such a consequence would be to me and my family, it was not sufficient to deter me from doing what I believed to be my duty, when a concatenation of unforeseen and unforeseeable events required prompt and energetic action for the honor and interests of my country."[2]

At 4 p. m. on the 19th of October, Captain Armstrong was sent ashore under a flag of truce to demand the surrender of the post to the United States. After two hours of discussion, the terms were settled, and about 9 a. m. on the 20th, the articles of capitulation were signed. The American force took possession of the abandoned castillo, over which the Stars and Stripes were raised in place of the Mexican flag, and a few minutes after noon, a salute was fired from the frigate and the sloop, the guns of the fort replying. The next day, Jones discovered, through late Mexi-

[2] 27th Cong., 3d sess., House doc. No. 166, pp. 70-71.

can papers and commercial letters from Mazatlan, that the facts were by no means what he had supposed—that there was no war, and that there was no evidence that the idea of cession to Great Britain was entertained by the Mexican government. He had, in fact, seized upon a province of a country with which his own government was still at peace. He therefore immediately completed the act of retrocession to the original authorities with all proper and customary marks of respect, and retired from before the place.

This somewhat precipitate movement on the part of Jones compelled a change in the command of the squadron, as a species of propitiatory offering to the Mexicans. He was accordingly recalled, and Commodore John D. Sloat was sent out as his successor. No censure, however, was ever passed upon Jones for his very decided action, and it is to be supposed that the vigilance of the officer was acceptable to the government at home, rather than otherwise. Jones remained at Monterey until the end of the year, deeming it prudent to await positive information from our government respecting Mexican relations. During this time, his relations with the authorities were altogether friendly, though he found it necessary to issue a warning that Mexico would be held responsible for any acts of hostility to foreigners, since it was feared that the news of the retrocession might not be so promptly circulated as had been that of the capture.

On October 26, the sloop-of-war *Yorktown* arrived at San Francisco from Callao, and proceeding to Monterey, was despatched on or about November 21 to Mazatlan and San Blas, to cruise later in the Gulf of California. She carried Lieutenant Henry J. Hartstene as a bearer of despatches to Washington. At the same time, the *United States,* under Captain Armstrong, was sent to the Sandwich Islands for supplies, Jones transferring the broad pennant to the *Cyane.* On November 1, the commodore had, in a letter to Micheltorena, accepted that officer's proposition to hold a personal conference in the south, and had expressed his intention of coming down the coast about the middle of November. But he was detained much longer, both by the non-arrival of other vessels belonging to the squadron, and by his investigations and efforts to obtain some legal authentication in the case of the Americans who claimed damages for exile in 1840, as narrated above. In this undertaking he was not very successful. On December

11, he sailed with the *Cyane,* and arrived in three days at San Francisco, where he was joined by the *Dale,* from Panama, bringing news of amicable relations between the two republics down to the month of June. From San Francisco, Jones proceeded to Sonoma, where he was hospitably entertained for a few days by Colonel Vallejo. The *United States* returned from Honolulu in December, and all three vessels sailed from Monterey on January 9, 1843—the *Dale* and *United States* for Mazatlan, while the *Cyane,* with Jones on board, touched at Santa Barbara and San Pedro. The store-ship *Relief* had also arrived before the departure of the other vessels, and soon followed them southward, while the *Cyane* returned later in the year.

Upon his arrival at Santa Barbara on the 14th of January, 1843, Jones informed Micheltorena of his readiness for the proposed conference at San Pedro, to which port he proceeded on the 17th, and late in the afternoon received an invitation to visit the general at his headquarters at Los Angeles. Next morning, Jones landed with Commander Stribling and about six others; and at 2 p. m., the party set out for the pueblo, escorted by 25 mounted men of the Santa Barbara guard. At noon on the 19th of January, 1843, the conference was held at the general's headquarters at Los Angeles, where, after the drinking of toasts and making of complimentary speeches, Micheltorena proceeded to read his "Articles of Convention," copies of which were furnished for Jones's consideration. This ended the conference. The next morning, Jones returned the Articles, without his signature, accompanied by a note explaining that he had no authority to enter into such an agreement, and that the whole matter of reparation must be left to the respective governments. Friendly relations continued, and on January 21, Jones left the city, amid the beating of drums, firing of cannon, and ringing of bells. Three hours after his arrival at San Pedro, the *Cyane* sailed for Mazatlan, where she joined the *United States* and the *Yorktown* on the 1st of February.

The following is the generally-accepted verdict passed upon this transaction by the historian H. H. Bancroft:

"The occupation of Monterey by the United States for a day was an accident that resulted in nothing good or bad. It involved no taint of dishonor or of sharp practice for either the American commodore or his nation. It was but technically an outrage on Mexico, for which ample reparation was made. Its lessons were not important. It showed clearly what had not been wrapped in mystery before, that the United States was

not disposed to be forestalled by any European power in California, at least if it could be prevented by legitimate means. It confirmed what it had never occurred to anybody to doubt, that California was an easy prey for any nation that had only Mexicans to contend with. It gave Micheltorena a splendid chance to write himself an ass; and as to the Californians, while it was too brief to afford any reliable index to their sentiments, so far as it went it indicated a feeling of indifference at least. The leading Californians were more surprised at the restoration than at the capture, though perhaps it can hardly be said that they regretted it more. Most foreigners would have been pleased to see the occupation permanent. Mofras, writing from a French standpoint, declares that Jones should have kept Monterey and seized San Francisco. There was, however, among all classes in California, in Mexico, and in the United States, a vague feeling that the whole transaction had a hidden mysterious meaning in politics entirely distinct from that which the commodore gave it. People were slow to accept a version which was at the same time plausible, natural, and true."[3]

In 1842, also, the West India Squadron was discontinued as such, and its duties were transferred to the newly-created Home Squadron, the smaller vessels of which were destined for service in the Carribbean Sea and the Gulf of Mexico. As the question of annexing the Republic of Texas was then beginning to assume grave proportions under the administration of President Tyler, Commodore David Conner, in command of the Home Squadron, was instructed to hold himself in readiness for any emergency. Moreover, toward the close of Tyler's administration, Captain Robert F. Stockton was selected as the bearer of the celebrated annexation resolutions to the government of Texas.

Immediately on the adoption of the resolutions by Congress, in 1844, Stockton sailed on this mission in the new steam frigate *Princeton*. While on the coast of Texas during this cruise, Stockton was not content to remain a peaceful spectator of events. In May, 1845, when he was off Galveston, he seems to have tried to persuade the Texans to collect a force and seize Matamoros; and he offered, if that were done, to support the movement with his ships. But Chargé d'Affaires A. J. Donelson thought it best to warn Stockton against any premature action by his squadron. Finally, in June, 1845, he received orders to repair with his squadron to the mouth of the Sabine River, for the purpose of transporting the American troops under Taylor to whatever positions Donelson and the Texan authorities should deem most expedient. The infantry and artillery were accordingly embarked and con-

[3] Bancroft, History of California, Vol. IV (Works, Vol. XXI), p. 329.

veyed to Corpus Christi, the cavalry proceeding by land to San Antonio.

This flying squadron of Commodore Stockton's consisted of the steam frigate *Princeton,* sloop-of-war *St. Mary's,* and brig *Porpoise.* The vessels were very instrumental in carrying despatches between Commodore Conner, of the Home Squadron, and General Taylor in Texas, as well as between the Mexican and American governments. The *St. Mary's* also conveyed the Hon. John Slidell, the newly-appointed envoy to Mexico, from Pensacola to Vera Cruz. And as soon as news of the first battle between the American and Mexican armies was received, the entire Home Squadron proceeded to blockade the east coast of Mexico.

Meanwhile, however, Captain Stockton had returned to Washington with the news of the annexation of Texas, and conferred with President Polk upon the probability of a war with Mexico. Polk, realizing its inevitability, and looking upon California as the proper theater on the Pacific coast for the prosecution of hostilities, appointed Stockton to reinforce our squadron in that region. The frigate *Constellation* was at first designated as the ship which he was to command; but subsequently he was ordered to hoist his broad pennant on the frigate *Congress,* which could be got ready for sea in less time. In her he was instructed to convey the commissioner, Mr. Ten Eyck, to the Sandwich Islands, with sealed orders respecting his further destination.

Our trade on the west coast of Mexico was at that time quite well prepared to take care of itself against any possible privateers. The delicacy of the relations between Mexico and certain European countries, in connection with the Californias, principally occupied the attention of Commodore Sloat, the officer then in command of the Pacific Squadron. It was understood to be the policy of England to effect, through her merchants, in the event of hostilities between the United States and Mexico, such a transfer of these two provinces as would give them a claim of a very embarrassing nature, in the shape of security for money lent, or to be lent.

Commodore Sloat had received instructions, about the middle of the year 1845, requiring him to act promptly if the emergency should arise. It was the earnest desire of the President, he was told, to pursue the policy of peace, and Sloat was therefore directed to be "assiduous and careful" to avoid anything that

looked like aggression. If, however, the Mexican government should declare war, he was to act with vigor. These orders were slightly modified in October, Sloat being then instructed that "in the event of actual hostilities," he was to dispose his entire force so as to carry out most effectually the objects specified in his instructions. These instructions were conveyed to Sloat by Lieutenant Archibald H. Gillespie, of the Marine Corps, who travelled by way of Mexico. He reached Mazatlan in February, 1846, and was sent on to Monterey in the *Cyane*, arriving there on April 17, 1846.

In the state of uncertainty then existing on the west coast, Fleet Surgeon William Maxwell Wood offered his services for the perilous mission of obtaining news of a definite character for the commodore. He asked and obtained permission to return to the United States through Mexico, at the same time being made the bearer of secret despatches, and set out on his journey in the garb of a civilian, carrying his uniform at the bottom of his luggage. Arrived in the City of Mexico, Wood gathered all the information he could, and sent it on to Sloat via Guadalajara. Wood, continuing in plain dress, and passing himself off as an Englishman, also inspected and made a report on the Castle of Chapultepec, and while making his observations, had some brusque words with a German who was an artillery officer in the Mexican army, and who was completely bluffed by Wood's manner. After staying about ten days in the city, Wood proceeded on his way to Vera Cruz, running great risk of capture and execution; but through the courtesy of the commander of a neutral man-of-war, he was put on board the flagship of Commodore Conner's blockading squadron, where his information was regarded as of sufficiently great importance to warrant the detaching of one of the minor vessels of that squadron to convey him to Washington as speedily as possible.

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SOME THOUGHTS ON OUR LACK OF A NAVAL POLICY

By MAJOR HENRY C. DAVIS, U. S. Marine Corps

Upon the arrival of the battalion, of which I am a member, in Guam, there were many conjectures as to the purpose of the Department in moving us from Olongapo and, I think, uppermost in the minds of many of the officers of the battalion was the thought that, at last, Guam was to be recognized as *the* place for a naval base in the Pacific.

Many of us had seen the fluctuation between Cavite and Olongapo, with the resultant disorganized condition of having nothing definitely settled; and many of us had wondered at the good fortune, which follows us as Americans, in not having to resort to arms in the settlement of our Eastern questions. Any recourse to arms would have found the Eastern possessions in no condition to provide adequately for a fleet such as we would need in that part of the world.

Someone or something has too long neglected, or been unsettled in its own mind, as to the base in Eastern waters, and too long the efficiency of the navy has suffered from this neglect. Not that the officers of the fleet and shore stations in the East have not done all that mortal man could do with the material and means provided for them; but always they have done their work with the feeling that it was not permanent but temporary in character, so far as the shore stations are concerned. This was because there was, and is, no settled and definite policy for them to carry out; no well-thought-out policy being handed from one administration to another, with the efforts of the different directing heads working to the accomplishment of one end—*an adequate efficient first-class base for the fleet in the far East.*

The lack of a definite policy for our naval forces, and the efforts of each administration to do what *it* thinks best, irrespective of

what has already been done, cannot but be harmful to the fleet; not directly in the fleet but in those things that have their proper bearing and relation to the efficiency of the fleet. It is harmful that after 15 years of occupancy of our Eastern possessions we are still without an adequate naval base in the very portion of the world where we are most likely to have need of it.

Our system of government is doubtless, and without meaning to be, responsible for this lack of policy; and the navy has done wonders under it, but there are glaring examples of the lack of results for which our lack of policy is responsible and which cannot but make one, whose life and interests are a part of the navy, feel that more could be accomplished if we were more "progressively continuous" in the application of the funds allotted for naval expenditure.

To illustrate more clearly what I mean let me give an example which occurred right here in Guam. A governor, who was also the commandant, decided that the efficiency of the naval station would be increased by the construction of a wagon road from the coal shed, on a small island, connecting with the road from the main town to the port. He, so far as I know, set about building this road, not carrying out any definite policy laid down for him by his superiors, but on his own hook, so to speak, and in the building of it there were needed two causeways, one connecting the main island and one across a small indentation of the small island's shore line. Into the construction of this road some thousands of dollars went; but before the road was finished this governor-commandant was ordered home. His successor, in due course of time, looked over the place and came to this incomplete road. He immediately decided, also not carrying out any policy but his own, that the money already spent was wasted and that the road was neither desirable nor necessary. What was the result? The two unused stone causeways are all that the government ever got out of the money spent and it now represents just so much money in the ground. Would this have been possible if these men had both been instructed as to the policy for the station in question? Could such a thing have happened under a programme of systematic improvement of the station? I say it could not and I say it is the duty of those in authority to see that such things could not happen by having definite policies of improvement laid out and continued from one administration to another.

It is not a question of criticising the action of either of these individuals but one of the lack of system or policy under which they worked. Certainly, if the first man put, let us say $10,000 into the work, it should not be possible for his successor to leave this money lying in the ground; and certainly it should not be possible for a thing of such importance to be subject to the opinion of one individual.

As also indicating what a lack of policy has done for Guam, let me give one more example; whose the fault I do not know nor can it properly be said to be the fault of anything except the lack of policy with regard to our bases: We have had Guam nearly 17 years; but to-day a 50-foot steam launch, sent out for use at the naval station, cannot come through the channel to the small dock at the port under her own steam, *because she draws too much water*. Seventeen years; a naval station; a steam launch, carried on a modern battleship, cannot get under her own steam and come to the dock! Does or does not that indicate that our system is wrong? I leave it to any fair-minded person.

Certainly a million dollars a year, applied to a progressive building programme, would have given us now a station to be proud of instead of what we have; a place where the second-hand, cast-off equipment of other yards is sent in lieu of not getting anything; a place on which may some day soon depend the fate of our fleet.

I have been told by officers, who have made a more careful study of the subject than I have, that nearly fifteen million dollars have been spent by the Navy Department on Guam in the nearly 17 years that we have had the island and, if this be so, the results we have to show for it are a living arraignment of the system or lack of policy under which such a thing could happen.

If, for the purpose of discussion, we admit that such an amount of money has been spent, and if, at the same time, we realize that there is no dry dock; there are no piers for large ships; there is no safe harbor; there is no high-powered wireless; there is no adequate water supply; there is only a very limited system of passable roads; there are only the most primitive shops placed more than five miles from the nearest anchorage; there are no storage facilities except for the garrison from transport to transport; there is no adequate cold storage; there is no adequate electric light system; there are no quarters for anyone except the gov-

ernor and the commanding marine officer; there is only a small dredge with a 1 cubic yard bucket, all these, if realized, must make the lack of a definite progressive policy stand convicted of the grossest neglect, because *we could have had them all* if we had had a definite progressive policy at work for the past 16 years.

Only by the adoption of a definite policy, laid down by the military officers who have studied the problem, can we hope to make such neglect impossible in the future; and only by the rigid adherence to the policy until it is consumated can we hope for proper progressive advancement.

Had such a policy been ours in 1898, we to-day, would have in the East an impregnable, fully equipped, modern base, ready for any emergency and an asset of countless value to the United States. As it is we have an enormous liability; one which may eat up all the profits of the fleet.

No other nation in the world would have so flagrantly neglected a place of such importance. Even though we persist in that so well named "Valor of Ignorance," by which we assume a soldier may be made by dressing him in a uniform and giving him a gun; no wildest stretch of the imagination can call into being the genii of Aladdin to build us shops, dry docks, piers, storehouses, guns and forts, waterworks, roads and railroads in a day or a night, and these are what we need more than tongue can tell.

Even the month it takes to get here from the United States may be a month fraught with irretrievable loss to us, because we have no adequate base in these waters and no policy looking to the establishment of one.

A business man or a firm in looking ahead and extending his business lays out a definite programme; it may be a selling policy, a building policy or a retrenchment policy; in any case it is *definite* and it is *the* thing which will make his business more efficient; these are the days when only the most efficient is successful in anything, whether it be governments, firms or individuals.

There is no doubt that the evil from which we are now, and have been suffering for many years, cannot be changed by merely talking about it and finding fault with it; but it is equally certain that the system or lack of policy can be changed by the people being made to realize that the *business* of their navy, like any other business, should be principally in the hands of the men *who have made it their life's work and study.*

Under our system of government there must be a civilian at the head of the Navy Department; this may be right or wrong, and it is not my purpose to discuss the merits of this system, but one thing must certainly be apparent to every one who gives the matter thought and that is; that no matter who is selected for the civil head of the navy he cannot have the requisite knowledge of its needs and desirable policies, because, in nearly all cases, he has never given the navy any intimate study previous to taking his office.

To guide the Secretary of the Navy and to place matters of naval importance before him in the order of their importance, there should be authorized by the National Legislature a body of military officers who could and would have the authority to lay out a definite policy for naval progress. This policy laid out and adhered to should not cease with each change of the head of the navy, with each change of the administration, but should pass on from one to the other until accomplished, because, the men who make the policy would, in such a case, be the men who had spent all their lives in the navy and, therefore, in a position to know its needs.

When President Wilson appointed the board of bankers, who will be at the head of the new banking system in this country, he did not select doctors or chemists or artists, he selected *bankers;* men known to the world to be experts in their lines, and it should be the same in the affairs of the navy. The men who make the policy of the navy should be the experts, the naval officers who are the only men available as experts.

The president of a company carries out the policy of his board of directors and if we assume a Secretary of the Navy to be in a similar position, he, too, should carry out the policy of his board of directors—the naval officers. Doubtless every secretary is not only willing but glad to carry out the policy only *there is no* policy, progressive, continuous and unchanging.

Who can fail to realize how vital it is to the whole nation that we have such a policy when the possession of an impregnable, modern, first class base in the far East would make a war in the Pacific almost out of the question? Such a base we could have had if the fifteen million dollars said to have been spent in Guam had been spent in small sums each year, all going to add to each year's progress.

All that can be done, under the present system, is being done to make up for 15 years of neglect, and every little bit helps; but how much more satisfaction it would be to all concerned to see each year some progress to a definite end, to watch the structure grow until finally it reached perfection.

The National Legislature has had before it a bill to appoint a Council of National Defence, and in the matter of National defence, it is certainly a step in the right direction, if the bill ever becomes a law. Even now the General Board of the Navy could, to a large extent, lay out a scheme of progressive advancement in those matters which are vitally important to the fleet but yet not a part of the actual fleet. The General Board could, to a large extent, influence the policy of the navy relative to its bases and make schemes to build up those foreign ones which we most need. They have not done so, at least no results show, and it may be that I impute too much power to that board.

We are very prone when speaking of the navy to bring to our minds the Atlantic fleet. The Atlantic fleet naturally is very important but the importance of those things on which the efficiency of the fleet depends should not be overlooked when the *navy* is considered. The navy cannot be efficient unless it has adequate and sufficient base facilities abroad as well as at home. *We have no adequate base facilities abroad.*

Should the Pacific become the theater of a war the fleet, now called the Atlantic fleet, and by some the *navy*, would become THE FLEET. And in this event *the fleet* would be tied to the west coast of America by the invisible, but none the less strong, steaming radii of the ships. This is certainly not right and it certainly is not policy. One may say, "What about our colliers," and the answer may be the same thing as about our bases, because it is only recently that Congress has realized the necessity for a *train* and they do not yet seem to have realized the necessity of bases abroad.

Ports may be seized at Advance Bases but the advanced bases will not, from their very nature, be places where any and all repairs to the fleet can be made. They will themselves be based on and supplied from some permanent base; some such place as we have not.

Such a place we could have had and still can have, but only when there is a programme laid out which will be independent

of the many changes of administration which must occur before it is completed. This means the *adoption* of a policy which is of vast importance to the navy; a policy preparing the necessary and adequate bases outside the home waters for use of the fleet; a policy of giving to these matters the importance they deserve because they so intimately concern themselves with the welfare and efficiency of the fleet.

A fleet without bases is like a boxer without a punch: he can spar and avoid punishment but he cannot deliver the knockout blow. The first mission of the fleet is the destruction of the enemy's fleet; the knockout.

The auxiliaries of the fleet are of such importance that they should not be overshadowed by direct fleet matters as is so apt to be the case. The fighting fleet has to be kept in the highest state of readiness and efficiency and this can only be done in its truest sense by having the necessary, and vitally important, bases outside of the continental limits of the United States.

Such bases cannot be constructed in a day or a month or a year; they can only be obtained by constant application of the money allowed to a progressive building policy. The fleet cannot get from the sea a single thing which will allow it to keep the sea without recourse to land.

Admitting, as every one must, that bases are not only important but absolutely essential to an efficient fleet, does it not seem that we have been very, very neglectful of them and their preparation for efficient service?

Take the Philippines for example. Several places there were considered as bases. Olongapo and Cavite went through the disorganizing process of changing back and forth, first one and then the other place being considered as *the best* place for a naval base. Olongapo would require eighty or one hundred thousand men for its proper defence, and we have no such force to put to such a task, nor can it be properly considered that a base requiring that number of men is a good place for a base. Cavite is too congested and there is not enough water, besides it would fall as a result of the fall of Manila, which is inevitable in a modern war, because we have not the necessary army to protect it nor could we get even our volunteers prepared in time.

Admiral Mahan says in part, in his Naval Strategy, Page 195, *et seq.*:

First of all what is the essential military requisite of a naval station? Evidently that it should be useful in war. Now, in these days, when it takes at least two years to build and equip a battleship, it is evident at once that shipbuilding cannot be reckoned a primary military object in a navy yard. If ships built in a navy yard are better or cheaper or built more rapidly, those are good industrial reasons; but none of them is a military reason.

The highest function of a navy yard is to maintain the fleet in efficiency in war; and especially to restore it in the shortest possible time when suffering from injuries, whether arising from ordinary service or in battle. No utility in peace will compensate for want of this in war. The selection of particular sites to serve this end should be governed by this one consideration of usefulness in war; which may be analyzed, as we have before, into: Position, Strength and Resources.

Of these resources, the chief one is copious provision for docking rapidly. This applies to all chief naval stations whether on the home coasts or abroad.

So far as our home coasts are concerned we are rather well fixed, but our foreign bases are absolutely without any kind of docking facilities for a dreadnought or super-dreadnought.

This is not the fault of any individual or of any group of individuals, but it most certainly is the fault of our lack of policy for the navy.

When England surprised the world with the dreadnought we read that by 1915 they would have such and such numbers of ships of this or a better type. We read that Germany by 1915 would have such and such numbers of ships of this or that type. Has any one ever read that the United States at any time would know or complete a policy of building which would give them such and such numbers of type ships at a certain time? No. Why? Because our policy as such does not exist; because even Congress is not sure as to what it will do nor is it sure that any policy it may outline will be carried out by the changing members as they constantly come and go. A policy covering all the needs of the navy may take 10, 15 or even 20 years to accomplish. There is no time to start like the present. There is none to start it like the officers of the navy, if empowered by Congress.

If a Council of National Defence existed by law and if the navy members placed before it a programme saying, "This number of fighting ships of these classes, this number of train of these classes, these bases with this equipment, these men of these rates, these civil forces of these classes, etc., are needed to make a well-

balanced fleet"; then if Congress would appropriate say two hundred and seventy-five million dollars to start the programme, placed to the credit of the Council of National Defence, or whom they empowered, who can question the large increase in efficiency such a policy would give to the navy? But when Congress appropriates so much money for such a purpose, so much money for this or that, specifying its use and making it illegal to use it otherwise, then just so long will it be impossible to intelligently progress from year to year because congressmen change just as cabinet officers do, and Congress nearly always changes the recommendations made to it by the experts, the naval officers.

The fearsome figure of militarism rises and shakes its head at the mere mention of allowing the trained men of the army and navy to run the business the government pays and trains them to run, and congressional prerogative is in fear of loss, by Congress, unless things remain as they are.

The government spends large sums of money each year to educate the cadets and midshipmen to be officers, these men have selected the army and navy as their life's work; they spend their lives in it, they study its problems, and they arrive finally at the ranking positions in their services. Are these men a peculiarly devilish type of individual, who after 30 or 40 years of service to his country, is not to be allowed to have the weight he should have in the councils where the policies affecting his branch of the government service is concerned? Does the country feel that these men are less capable of formulating a policy for its navy than is a civilian, who probably never studied one of the naval problems previous to taking his office, which he gets not for particular fitness but because of his political prominence? Certainly, if the country has thought of it at all, which I doubt, past events indicate that it does consider its affairs, so far as the navy is concerned, managed to its satisfaction because it has not directed its representatives in the National Legislature to change the system. It is for us to educate the people of the entire nation up to this point; not a lobby but an educational campaign.

Our government goes unhesitatingly to the experts in every line when they can give the advice needed, except the naval and military experts. Its pays enormous sums for this expert advice, but the man who gives his life to his service, the man who is an acknowledged expert in his line, has a very small voice in the making

of policies for his branch of the service. Only a government could conduct its business along these lines; no private corporation would last a month.

How can we rectify these defects?

First, by educating the people of the country to the point where they will demand that the expenditure of their money on their navy will be in the hands of their trained experts; by educating them to the point where they will have no fear of the dread spectre of militarism arising to tear from them all their liberties simply because the experts of the navy wish to have more to say about running the navy, as in every business in their own civil life they demand, and get, experts for its supervision whenever and wherever possible.

Second (as the result of the demand of the people), legislation making possible the creation of a board or staff for the navy which will decide on and settle a policy of progressive increase in the fleet, its auxiliaries and its bases.

Third, by educating Congress to the point where they will realize that the men who desire to formulate the policy for the navy do so only with the heart-whole thought of increasing the efficiency of the navy, because of their more expert knowledge of its needs, and not with any desire to rob the Congress of its prerogatives; and,

Fourth, by making the people realize that any disaster to us in a war in the near future will not be the result of lack of foresight and preparation on the part of the army and navy, but of those unpatriotic people who will not let the trained officers of the services run the very thing for which they are trained, because the hydra-headed monster of militarism is brought out whenever these officers make, even a feeble, effort to run their own business.

To carry into effect the first suggestion of educating the people we have the Navy League. This society should have governmental support in a pecuniary way. They should, in my humble opinion, do more tract work. The publication of a magazine is not enough. Free literature, educational and coldly logical literature should be sent broadcast through the country. The League's membership should be increased a hundred fold by such literature. Look at Germany which, three years ago, had over eight hundred thousand members of its Navy League, all working for a better and larger fleet.

We should be as united as Germany on our naval policy. Naval and marine recruiting officers, all over the country, should not miss any opportunity to acquaint the people with the aims, needs and desirability of a fixed policy for our navy. The midland sections of the country are most apt to fail to see the aid a navy will give them. Educate them up to it! *Make them see that their corn and their oats and their crops will have no markets if we can't keep our ports open in time of war!* Make them see that only the navy can do this! Educate them! Enthuse them with your own spirit in the matter! Make them unanimous on the necessity of having a naval policy, fixed, definite and progressive!

The matter is too important to be made one of party politics. It should be one national in its aspect because it affects the whole country and not one party or another. Congress itself casts aside party lines when crises are imminent but *when crises are imminent, in naval matters, it is too late.* Ships, docks, shops and machinery cannot be materialized in short periods by merely voting the money, and the patriotism, which needs the stimulus of a national crisis to be awakened into material action, is hysterical and not true patriotism. True patriotism realizes the country's shortcomings and does its best at all times to correct them; true patriotism sees the *responsibility of the Congress to the nation* and provides adequate insurance of safety to the people.

The best peace insurance is liberal, well thought out, practicable and extensive preparation for war. This means, first, a definite policy; second, money; and third, MORE MONEY. No matter how much money it means, we can afford it, and it will mean less than even a short war; less in loss of national prestige, less in blood and less in honor.

It is somewhat difficult to make the necessary distinction between Naval Policy and National Policy because one is necessarily dependent on the other.

Assuming that our best known National Policies, the Monroe Doctrine and the Open Door, are those which the nation will carry out as the years go on, and knowing as we do that other policies are bound to be decided by a progressive nation, then we can and should adjust out Naval Policy to best make the National Policies concrete matters and not academic themes, which may or may not be respected.

The war in Europe to-day will plainly show any foresighted person what would happen to any nation which allows its army and navy to fall below the high standard set by those less sentimental and more practical peoples who know that policies require force to be effective.

Oratorical outbursts and diplomatic correspondence have never prevented a stronger nation from over-riding a weaker. They never will until human nature changes.

Truly the "God of Battles is with us yet."

Our national egotism, our valor of ignorance, our dangerous self-assurance must strike as marvelous the older nations of the world.

England looks with the greatest respect on the magnificent army of Germany; France and all the world look with the greatest respect at the navy of Great Britain; Germany looks with the greatest respect at the vast army of Russia; but we, wonderful, all-powerful, superhuman, marvelous, self-sufficient Americans have only to place a gun in his hands, clothe him in uniform and the American youth by some necromantic trick becomes a veteran soldier, capable of bringing the world to its knees! O! Folly, folly; truly you are American!

Even worse is the same idea when applied to our navy. We *can* feed the youth of the country to the gaping mouth of war because we have the youth; but we cannot make ships and guns and armor and bases out of oratorical forensics of these warriors who proclaim our valor, but stay at home and mislead the ignorant by their pitiable lack of realization of the seriousness and necessity of the things the country needs for its defence.

The man who stands before an audience and tells the untrained youth and manhood of this country that they can, without any training or preparation, whip the world, does terrible harm; harm that only education of the people, whose homes and finances will be ruined and depleted, can ward off. Only the enlightment of the people will eradicate this harm and make it possible for them to throw back the lie to him who utters it; because they will know the truth.

It behooves us then to start a campaign of education; it behooves us to put the clear, cold facts before the people and bring them to a realization of what unpreparedness may mean.

When public opinion is educated to the point of asking their representatives in the National Legislature why the many matters of National Defence have been neglected, which, by their education they will know have been, then the results which every American wants to see will begin. They won't begin before this time.

The experts whom the country has trained, the men who have given their lives to the study of these problems will come into their own and the defence of the country will be in safe, sane and expert hands in all that concerns its honor, integrity and material prosperity, now and in the future.

This ideal condition may only come after a humiliating defeat, and, with present conditions, that is a probable outcome of a war with a modern first class power, but come it will. Then the ghastly, pitiable, humiliating lesson will have been learned through experience; an experience which might have been avoided had the defence of the country been in the hands of the army and navy and not the hands of the politicians.

The ultimate fate of the Philippines, no matter what it may be, should not effect our *naval* policy in the Pacific. There still remains Alaska and our own Pacific coast. Where two nations border on, and desire the control of an ocean, their relations exist for years undisturbed; but the time comes when one or the other must go back leaving the ocean dominated by the other. For "the most progressive people on the face of the globe"(?) retrogression is out of the question without national dishonor. Not to recede means to fight. For this we must prepare. This preparation means the establishment of a first class naval base in our possessions in the Pacific.

Because of the vast distance of these possessions from our west coast this base must be capable of performing, as Admiral Mahan says, "The highest function of a navy yard . . . . to maintain the fleet in efficiency in war; and especially to restore it in the shortest possible time when suffering from injuries, whether arising from ordinary service or in battle."

This base, owing to its great distance from home and sources of supply, must be outfitted completely with materials, machines, docks, harbors, fortifications, and forces, both civil and military; and, quantities of all, sufficient for two or three years supply for the most powerful fleet we will ever have acting from that base.

All this we would have had now, had there been a *definite progressive policy* passed along from year to year, a policy which no change of administration could alter before those doing the work reported, " we are ready."

Neither the army nor the navy can be held responsible for what may happen to us, of disaster, when the war we are sure to have decends upon us. They will do their part, they will give a good account of themselves, but as far as the navy is concerned, it cannot get blood out of a turnip; a first class base cannot be constructed over night.

The coming of our next war will not be heralded by long months of diplomatic correspondence; the cables prevent that. It will come to us out of a night's deliberation by a people ready and sure of its strength and capabilities. A blow will be struck, and we, fatuous, shortsighted and incomprehensible people that we are, will gasp and struggle in the mire of unpreparedness. Our untrained youths will lay down their lives willingly on the altar of the country which has allowed them to be led astray and kept them ignorant of the seriousness of war. Our valiant stay-at-home orators, on whose shoulders the responsibility for our youths' ignorance rests, will make the forums ring with hysterical outbursts of bogus patriotism, while the flag we are taught to love will be cast into the shadow of defeat, because of the *valor of our ignorance.*

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE EFFECTIVENESS OF SKILL

By Rear Admiral Bradley A. Fiske, U. S. Navy

So great is the effectiveness of modern ships and guns and engines and torpedoes, when used with perfect skill, that we tend unconsciously to assume the perfect skill, and think of naval power in terms of material units only. Yet daily life is full of reminders that when two men or two bodies of men contend, the result depends in large though varying measure on their relative degrees of skill.

Whenever one thinks of using skill, he includes in his thought the thing in the handling of which the skill is employed. One can hardly conceive of using skill except in handling something of the general nature of an instrument, even if the skill is employed in handling something which is not usually called an instrument. For instance, if a man handles an organization with the intent thereby to produce a certain result, the organization is the instrument whereby he attempts to produce the result.

If a man exercises perfect skill, he achieves with his instrument 100 per cent of its possible effect. If he exercises imperfect skill, he achieves a smaller percentage of its possible effect.

To analyze the effectiveness of skill, let us coin the phrase, "effective skill," and agree that, if a man produces 100 per cent of the possible, his effective skill is 100 per cent, and, in general, that a man's effective skill in using any instrument is expressed by the percentage he achieves of what the instrument can accomplish; that, for instance, if a gun is fired at a given range under given conditions, and 10 per cent hits are made in a given time, then the effective skill employed is 10 per cent.

From this standpoint we see that imperfect skill is largely concerned with errors. If a man uses, say, a gun, with perfect skill, he commits no error in handling the gun; and the smaller the sum

total of errors which he commits in handling the gun, the greater his effective skill and the greater the number of hits.

The word "errors," as here used, does not simply mean errors of commission, but means errors of omission as well. If a man, in firing a gun, fails to press the button or trigger when his sights are on, he makes an error just as truly as the man does who presses the button or trigger when the sights are not on.

Suppose that, in firing a gun, under given conditions of range, etc., the effective skill employed is 10 per cent. This means that 10 per cent of hits are made. But it means another things equally important—it means that 90 per cent of misses are made. To what are these misses due? Clearly they are due to errors made, not necessarily by the man who fires the gun, but by all the people concerned. If the correct sight-bar range were given to the gun, and if the gun were correctly laid and the pointer pressed the button at precisely the right instant, the shot would hit the target, practically speaking. But, in actual practice, the range-finder makes an error, the spotter makes an error, the plotting-room makes an error, the sight-setter makes an error and the gun-pointer makes an error. The sum total of all of these errors results in 90 per cent of misses.

Suppose that by careful training these errors are reduced in the relation of 9 to 8, so that instead of there being 90 per cent of misses there are only 80 per cent. This does not seem a very difficult thing for training to accomplish, but note the result: the hits are increased from 10 per cent to 20 per cent. In other words, by a decrease in errors in the relation of 9 to 8, the effective skill and the hits are doubled.

Conversely, if the errors increased in the ratio of 9 to 10, the misses would increase from 90 per cent to 100 per cent, and the hits would be reduced from 10 per cent to zero.

Suppose now that the conditions are so very difficult that only 1 per cent of hits are made, or 99 per cent of misses, and that by training the misses are reduced from 99 per cent to 98 per cent. Clearly, by a decrease of errors of hardly more than 1 per cent the effective skill and the hits are doubled.

Conversely, if the errors increased in the ratio of 99 to 100, the misses would decrease from 99 per cent to 100 per cent, and the hits would be reduced from 1 per cent to zero.

But suppose that the conditions are so easy that 90 per cent of hits are made and only 10 per cent of misses. Clearly, if the errors were divided by 10, so that only 1 per cent of misses were made, instead of 10 per cent, the number of hits would increase only 9 per cent, from 90 per cent to 99 per cent.

Of course, this is merely an arithmetical way of expressing the ancient truths that skill becomes more and more important as the difficulties of handling an instrument increase; and that, no matter how effective an instrument may be when used with perfect skill, the actual result obtained in practice is only the product of its possible performance and the effective skill with which it is used.

Applying this idea to naval matters, we see why the very maximum of skill is required in our war mechanisms and war organizations, in their almost infinite variety and complexity. War mechanisms and war organizations are capable of enormous results, but only when they are used with enormous skill. There is no instrument or organization in the world that requires so much skill to handle as an instrument or organization employed in war, because of its high order of development and consequent complexity, and the great number of errors that can be made. No other thing demands such skill; on no other thing has so much money been spent; to perfect no other thing have so many lives been sacrificed; on no other thing, excepting possibly religion, have so many books been written; to no other thing has the strenuous exertion of so many minds been devoted; no other thing has demanded and employed such a high order of talent and genius and power of will and spirit.

A battleship is an instrument requiring skill to handle well, considered both as a mechanism and as an organization. Its effective handling calls for skill not only on the part of the captain, but on the part of all hands. The finest dreadnought is ineffective if manned by an ineffective crew. The number and complexity of the mechanisms on board are so great as to stagger the imagination; and the circumstances of modern warfare are so difficult that, as between two forces evenly matched as to material, a comparatively slight advantage in errors made will turn the scale in favor of the more skilful. A difference in errors, for instance, in the relation of 9 to 8, under the conditions mentioned above, between two fleets having an equal number of similar ships, would give one side twice as many hits as the other in any given length of time.

In March, 1905, the writer published an essay in the PROCEEDINGS OF THE U. S. NAVAL INSTITUTE called "American Naval Policy," in which the effect of initial superiority in gun-fire was shown in tables. One table showed that an initial advantage of only 10 per cent secured an overwhelming victory by an accumulative effect. Now a difference of 10 per cent in hits, under conditions in which the hits were about 10 per cent of the maximum, would mean, roughly speaking, the difference between 10 hits and 9 hits in a given length of time, or a difference between 90 misses and 91 misses; a difference in errors made of a little more than 1 per cent.

The conclusion to be drawn is too obvious to be stated. Perhaps the conclusion is not broadly new; but possibly the idea is new that so small a difference in errors made will, under conditions of sufficient difficulty, produce such a tremendous difference in results.

Now, a division is more complex and more difficult to handle perfectly than is a battleship; a squadron more so than a division; a fleet more so than a squadron; a navy more so than a fleet. Therefore, on the principle that the greater the difficulty, the greater the need for training, let us all train ourselves strenuously, to increase our skill. And let us hammer the conviction into our inner consciousness that need for training increases with the rank: not only because the effect of a mistake *per se* is greater in handling a big thing than in handling a little thing, but mainly because the higher we get in rank and command the more difference in result will follow a given difference in errors made, between us and an antagonist in war.

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FOUR CAPITALS IN WAR TIME

THE HAGUE, ROME, LONDON, PARIS

By LIEUTENANT T. S. WILKINSON, U. S. Navy

During the early stages of the present vast war, the writer was fortunate enough to visit these four European capitals, two of countries neutral to the struggle, two of belligerent nations. Such superficial impressions as could be obtained of the cities in these critical times may be of interest.

THE HAGUE

Beyond the fact that it is the seat of the Peace Congress, The Hague is little known to Americans. It is a beautiful old city of some 300,000 inhabitants, and is located at about the center of and near to the North Sea coast-line of Holland. Despite its age, the city appears very modern, and is excellently paved, lighted and cleaned.

In the latter part of August, the city seemed little changed from the normal. Crowds were in the streets; all the stores were open, with purchasers of every sort of article; taxicabs were charging about. But in every crowd were uniforms; in almost every street were bodies of men in uniform on the march, or drilling, or mounting guard. The Dutch army was mobilized, and many of the troops were in The Hague, either in barracks or in transit through the city. Once one started looking for them, everywhere one could find soldiers, and the normal crowds on the streets now showed as lacking one element, except as supplied by the soldiers, the young men of military age. Numbers of foreigners, most of them women, could be distinguished on the streets and in the hotels. Almost all were en route from Germany to their homes, whether in England, France, or America, and were anxious to get away as soon as possible.

Life seemed much as usual, with no element of depression or even seriousness, until one saw the summer playground of The Hague, Scheveningen. Three miles away from the city, on a wonderful beach on the open North Sea, this is a concentrated and glorified Atlantic City, with magnificent hotels, baths, and amusement palaces. But now, though at the height of the season in ordinary times, everything was closed; except for a number of children evidently down from the city for a day in the sand, the whole resort was deserted.

The people on the streets of the city did not seem anxious or worried, but when questioned individually, the Hollanders showed themselves gravely concerned as to the position of their country in the struggle. Some were in favor of Germany, others of The Allies, but all hoped and almost prayed that Holland might remain neutral. "Little to gain and all to lose," was the sentiment they all expressed, with regard to deliberate entrance into the war.

They realized, too, the difficulties of preserving neutrality which the geographical position of Holland along the seacoast of Germany and Belgium presented; but they had confidence that their ministry would be able to steer a straight course through diplomatic shoals, and prevent any cause of strife with either one party to the war or the other. As an example of the difficulties to be met, it was rumored at that very time that a demand had been received from England to cease, within 24 hours, the exportation of food and foodstuffs to Germany. Not only they personally, these Hollanders said, were hoping for preservation of the nation's neutrality, but they were sure that it was the almost unanimous wish of the entire country.

The population was calmly proceeding about its usual work, except as prevented by the absence of the soldiers from their employment, but all were united in the fervent wish that the land might be kept free from the maelstrom of the great war.

And, alone in its stately grounds on the border of the city, stood the Palace of Peace, empty, barred and shuttered—a mute testimonial to the futility of human plans for peace.

ROME

At the middle of October, for the first time perhaps in years, Rome had lost her cosmopolitan character, and was the Rome of the Romans and Italians only. The usual large colony of

foreigners had almost entirely departed; the numerous hotels were deserted; but superficially, conditions seemed normal, except for the absence of foreigners. The streets were crowded, the theatres and cafés were open, shops were doing business. The army had been long since mobilized, but little of it remained in the city, and there were no more than the usual number of uniformed men to be seen.

But somehow there seemed a tension in the air. Everyone was asking, not "How?" nor "Why?" but "When?" The old Pope had died and a new Pope had been inducted into office; the Minister of Foreign Affairs had just expired. But these momentous events, ordinarily of overwhelming importance, were dwarfed beside the popular interest in the war. War maps with their tiny flags gathered crowds around the shop windows; bulletins from Paris and from Berlin were blazoned in all the papers. Everything officially was neutral; but everyone, from the restaurant waiter to the patrician, was partial. Just as in Holland, sentiment was unanimous for the preservation of neutrality, so in Rome was it for its destruction. "We must join in; it is vital to us." "But on which side?" "The Allies, of course," with a bit of disgust at the questioner's stupidity. "But the Triple Alliance?" "Unpopular when made, and now untrue to every feeling of the people." "When?" "Who knows? I am not the government."

And everywhere, in the streets, in the scarcely veiled utterances of the newspapers, the people were asking: "When?"

LONDON

In mid-August, it was difficult to tell, from surface indications, that England was at war. The usual activities were going on everywhere; the streets were full; shops and theatres were open; vehicles of every sort were in the streets; no uniforms were in sight; all the life of the huge city was apparently unchanged.

True, as one looked for signs of war, flaunting posters were placed everywhere, even on the wind-shields of taxicabs: "Your King and Country Need You"; and flocks of newsboys swarmed about, displaying bulletins of their news—for crying the news was forbidden. The shop-windows were stocked with khaki shirts, field-glasses, money-belts, and military accessories; occasional notices marked the location of recruiting-offices.

But the prevailing attitude of the people seemed to be one almost of indifference and stolidity, as though they had not yet grasped the fact that England was embarked in a war, and a colossal war. There was no lack of young men in the crowds; there was no evident attendance at the recruiting-offices; such few bodies of soldiers as were occasionally to be seen in the streets were watched with interest, but not with enthusiasm, as they marched along. Perhaps this lack of public interest was due to the close censorship of the press, which prevented general knowledge of the part which England was playing in the opening operations of the war; for, at that time, the public did not even know of the landing of the Expeditionary Force on the continent several days before.

The financial situation, acute in the early days of August, seemed to have moderated, as far as the average person in the streets was concerned; and there was no evidence of hoarding, the stores and restaurants and theatres being well patronized.

At the theatres, bits of patriotic songs and spectacles were interpolated into the regular bill. The flags of the allied nations were brought out, one by one; France and Russia, and Belgium particularly, were greeted with great applause; Japan and Servia hardly at all. For the British soldier, as represented on the stage, there was little enthusiasm; but when the bluejacket appeared, he was loudly cheered, and "Rule Britannia, Rule the Wave" was joined in by the audience with far more fervor and enthusiasm even than "God Save the King." The navy evidently was the high favorite, possibly because of its spectacular features and brilliant history; but more probably because the public felt that it was its defense against the enemy, and that the army, while it might go to the continent to fight, was not immediately concerned with their defense and safety.

But at the end of August, London was much changed. The truth of the despatch of the Expeditionary Force had been published, and details were slowly leaking out of the terrible punishment that the English troops had bravely undergone during the long retreat through France. The censorship prevented much of this from being told, and when the "*Times*" produced a sensational article on this retreat, it was denounced even in the House of Commons, as calculated to depress the people.

But just the opposite effect was produced. For the first time London began to realize the war, and the seeming indifference

of the earlier days now became a vast enthusiasm. The people in the streets now talked war, read war in the hourly newspapers, and almost ate war. Before the hitherto almost-deserted recruiting-offices, long queues formed. In every part of town, in the streets and in unsuspected court-yards, one saw men in civilian clothes, shirt-sleeved, drilling away for dear life under the charge of some rough-voiced old sergeant. Evidence, too, of supreme patriotism was the number of uniformed nurses, singly and in squads, one saw in the streets and at the stations, leaving for the front, all hastening to bear their share of the burden. Patriotic demonstrations at the theatres became more intense, and now the army was receiving its due share of applause. And everywhere the people symbolized the fact that this was no longer merely the administration's war, but their own war, by the development of a real personal animosity against the German, and particularly against his Kaiser.

Kitchener was the man of the hour and the idol of the people; the call was: "Your King and Country Need You," but the army that responded was everywhere termed "Kitchener's Army." And it was responding now; the first army of 500,000 recruits was nearly complete, and another was to be formed. England was at last awake to the war.

PARIS

From England, isolated and secure from the horrors of war, to an invaded and harassed France. What would be found to be the attitude of the so-called "volatile French?" It was the beginning of September, and the German army had reached its nearest point (as it afterwards proved) to Paris, 20 miles away. Would Paris be despondent, desperate, hopeless; or would she be feverishly, illogically hopeful?

Neither. At the beginning of the war, the French people had shed the attractive mask of gayety and volatility, and had shown themselves with their true countenance, brave, serene, unafraid, and determined. And nowhere was this better exemplified than in Paris, at the time when the invader's vast army pressed so close upon the city and it seemed almost certain that another siege of Paris was about to begin. As the German army approached, all of the foreign colony in Paris, and many of the wealthy Parisians, left the city, leaving the residential quarter around the Étoile nearly deserted; but, though the railways were running to the

last minute, few of the bourgeois left their homes. And all who stayed awaited events with equanimity. They gathered vast herds of cattle and sheep and quartered them in the fields around the town, within the outer circle of forts; the Bois de Boulogne was filled with them, and the often fashion-thronged race-courses of Auteuil and Longchamps were now packed with cattle. Grain and foodstuffs were brought into the city, until it was provisioned with bread and meats to stand a long siege.

And everywhere about the city, with quiet seriousness, confident in their army in the field and in the garrison of their forts around Paris, moved the people about their affairs. The men of military age were all gone. "What of that?" said the women, and filled their husbands' or sons' places as conductors in the subways, as newsvenders in the kiosks, as managers of small stores. There was no rioting, no disorder of any sort; Paris was far more orderly than in the piping times of peace and the Apaches.

The streets, crowded by day, were dark and deserted by night; cafés were closed by order of the police at 9.30; all the theatres were closed, with the exception of a few cinemas; no music was allowed by popular sentiment. It seemed impossible, in walking the deserted streets at 11 o'clock, in profound darkness, lighted only by the revolving beams of the several searchlights continually "sweeping" for aeroplanes or dirigibles, that this city could be Paris. Even by day there was a sense of unreality; the pedestrians were there, but where were the throngs of automobiles and motor-busses? Gone to the war; and the street-crossings were no longer a danger to the unwary. An occasional taxi or a military automobile was an exception. Even with the exploits of the bomb-dropping "Taubes," the streets were safer than in peace.

Various newspapers, each limited to one edition every day, appeared frequently, and the crowd bought them eagerly; but there was little news other than the very conservative government "communiqués" of the situation, issued twice daily. Beyond the fact that the Germans had temporarily abandoned the attack on Paris to engage the main army on the Marne, nothing could be learned.

Soldiers of the city's garrison, of the garrison of the forts, of the automobile and flying corps, were everywhere in evidence individually, but there was little seen in the city of large marching bodies. They came in by train, were embarked in the subway at

the station, and were conveyed to another station if they were to go out by train, or to a convenient gate if they were to march out. Few wounded were in the city, for in view of the need of hospitals during the probable siege, the wounded were all being sent to the cities south of Paris. There was little of the pomp and panoply of war; but the closed hotels, stores, and theatres, the deserted streets, the dark and stillness of the night, all showed plainly that the hand of War lay heavily upon the city.

The women, disconsolate in the first few days of mobilization, had, now that the days of real battle had come, recovered their courage, and were bravely hoping for the best for their individual loved ones, meantime working everywhere for the army—as nurses in the newly organized hospitals in the deserted hotels, as sewing-women to make bandages for the wounded, and warm clothes for the soldiers for the approaching fall and winter. Postal communication with the soldiers at the front, later established, had not yet been arranged, and they heard nothing from their men-folk; but they worked calmly on, with faith in France and in Providence.

A diversion in this atmosphere of seriousness and intentness was offered daily by the visits of the Taubes. Regularly at five in the afternoon, for several days, a German aeroplane circled leisurely over the city, dropped several bombs, and as leisurely sailed back toward the enemy's lines before the French aeroplane guard of Paris could mount to fight it. A number of people were killed by the bombs, though no material military damage was done to the city; but that did not deter the populace from rushing out of doors at the approach of the Taube, and gazing interestedly up at it, wondering where it would drop its next bomb, and when that was dropped, if it were anywhere near, running hastily there, absorbed with curiosity to see what damage it had done. When, after a few days, a system of continuous patrols of French machines to keep away these Taubes was instituted, the people almost resented the deprivation of their one amusement of those dark days.

Eventually, the government admitted—for so grudgingly conservative were the communiqués—that the battle of the Marne was a French victory and that the Germans were in retreat. A celebration of some sort might well have been expected of the "volatile French." But no; they were immensely relieved as to

the immediate safety of Paris, and showed it by an air of cheerfulness, where before there had been only a thoughtful confidence; but it was no time to celebrate a victory until the enemy was off the soil of France. True, he was retreating, but he was still fighting, and he was still in France; and, confident and hopeful though they might be that he would soon be driven out of the country, they would not give themselves up to any mad rejoicing over what might prove to be only a temporary success.

It was impossible to think of the Paris of this war as descended from the Paris of the Commune. The calm, steadfast courage of its people, despite their realization of the power of the enemy at their very gates; their confidence in their armies and in the eventual outcome of the war; the absence of hysteria: all marked the wonderful basic qualities of the Frenchman, qualities often not comprehended by the world.

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METEOROLOGY[1]

By ENSIGN L. R. FORD, U. S. Navy

Since all meteorological phenomena are caused, directly or indirectly, by the action of heat, a consideration of the science of meteorology follows naturally a study of heat. In meteorology we have to deal with the temperatures at or near the earth's surface, where heat is received from two principal sources, viz., the sun and the interior of the earth itself. The solar heat is of most importance, since it is that heat which maintains the animal and vegetable life on the earth.

The phenomena produced in the atmosphere are called meteors; and meteorology is that part of physics which is concerned with the study of these phenomena. Meteors are divided into three classes: aerial meteors, such as winds, hurricanes, and whirlwinds; aqueous meteors, comprising fogs, clouds, rain, dew, snow and hail; and luminous meteors, as the lightning, the rainbow and the aurora borealis. Taking these up in their regular order, we may first consider the winds.

The atmospheric air, obeying the laws of gases, exerts pressure in all directions; and this pressure varies according to the density of the air, being at sea-level about 14.7 pounds to the square inch. This pressure, called the *barometric pressure*, from the instrument used for measuring it, would be practically the same for all places of a common altitude above the sea if it were not for the disturbing influence of the solar heat, and of movements of the air caused by unequal heating at different places on the earth. All gases, air included, are highly sensitive to the action of heat, expanding or increasing in volume as the temperature rises, contracting or diminishing in volume as the temperature falls. Suppose now that

[1] An essay delivered before the Postgraduate Department, U. S. Naval Academy.

the atmosphere over any considerable part of the earth's surface is maintained at a higher temperature than that of the surroundings. The warmed air will expand and its upper layers will flow off to the surrounding regions, cooling as they go. The pressure of the atmosphere at sea-level, over the heated area, will be diminished, while the pressure over the surrounding area will be increased. As a result of this difference in pressure, there will be a movement of the surface air away from the region of high pressure and toward the region of low. Thus a difference of pressure at sea-level is at once followed by a wind. If the atmosphere were everywhere of uniform temperature, it would lie sluggishly at rest over the earth and there would be no winds.

Observed barometric pressures at different places on the earth show the existence of a diurnal and annual periodic change. In general, the minimum pressure at any one place occurs at 4 a. m. and 4 p. m., while the maximum pressure occurs at 10 a. m. and 10 p. m. The annual change presents a variety of characteristics for different regions of the earth. On the continents there is a maximum pressure in winter and a minimum pressure in summer, while on the oceans the reverse is true. A graphic representation of the difference in air-pressure is made by the *isobars*. These are lines drawn on a chart, connecting all places having the same barometric pressure. Charts are prepared showing the distribution of air-pressure over the surface of the earth for each month during the year. Areas of relatively high pressures are called *highs*, and areas of relatively low pressure are called *lows*. The difference in pressure between two places is spoken of as the *barometric gradient*. This produces a gradient force, and air flows down a sloping isobaric surface in a manner somewhat similar to the flowing of water down an inclined plane. The velocity, as well as the direction, of the wind depends upon the relative pressure in adjoining areas, being determined by the barometric gradient.

The winds of the globe may be divided into classes as follows:

(1) General circulation of the atmosphere, a continual interchange of air between the equatorial and polar regions, due to differences in temperature between the two regions.

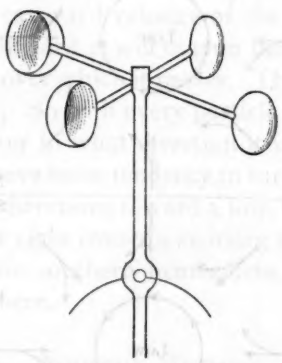
(2) An interchange of air between masses lying over bodies of water and land, due to the unequal heating of the two surfaces. When this interchange takes place over a great area, as between

continents and oceans, it has an annual period of occurrence and is called the *monsoon* wind. When the interchange takes place between coast lands and coast waters only, it is daily in occurrence and is known as the *land and sea breeze.*

(3) An interchange of air between mountains and valleys, due to the unequal heating and cooling of the two localities. This is called the *mountain and valley breeze* and is diurnal in occurrence.

(4) An interchange of air between extensive regions of higher and lower barometric pressure. This gives rise to the *cyclonic* and *anticyclonic* wind, which are irregular in occurrence.

(5) A local rush of air for the restoration of equilibrium, when it has been disturbed by local causes. To this class belong *spouts, tornadoes* and *squalls.*



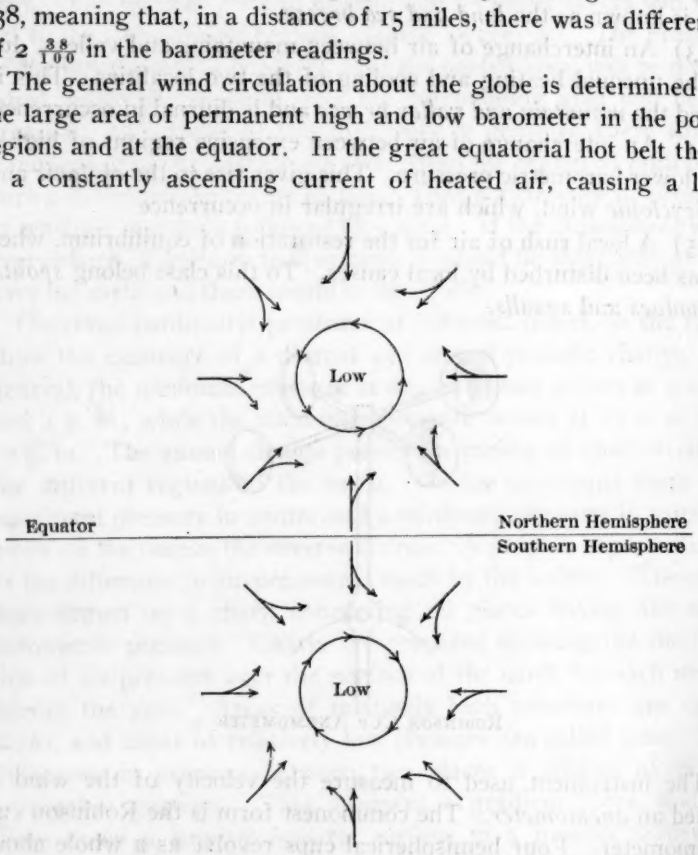
ROBINSON CUP ANEMOMETER

The instrument used to measure the velocity of the wind is called an *anemometer.* The commonest form is the Robinson cup anemometer. Four hemispherical cups revolve as a whole about a vertical axis when exposed to the wind. By means of an electrically operated chronograph or geared connection, the revolutions are counted. It has been found that the distance traveled by one cup, multiplied by 2.5, will give the velocity of the wind. The force of the wind is always expressed by mariners in terms of the scale devised by Captain Beaufort, in 1805, and known as the Beaufort scale.

The distance between isobars represents the barometric gradient; where they are close together, the gradient is very steep and the wind velocity is high. To compare barometric gradients, they are

reduced to hundredths of an inch per 15 sea miles. On this scale the steepest gradient ever observed was in the cyclone that passed over False Point, India, in September, 1885. This gradient was 238, meaning that, in a distance of 15 miles, there was a difference of 2 $\frac{38}{100}$ in the barometer readings.

The general wind circulation about the globe is determined by the large area of permanent high and low barometer in the polar regions and at the equator. In the great equatorial hot belt there is a constantly ascending current of heated air, causing a low



barometer; and there is a constant current of colder air flowing in from the colder regions near the two poles to take its place. This steady current produces the *trade winds*, that were so valuable to commerce in sailing-ship days. As these trades approach the equator, there are constant little rising currents, marked by trade-wind clouds. When the currents from the north and south meet in the equatorial region, they rise, generally quietly and steadily, but sometimes in great eddies or whirlwinds, with which we are familiar, in the form of tropical cyclones. This region, where the currents rise straight up, is known among seafaring men as the *doldrums*.

A noticeable feature of these winds is that they always tend westward in their path toward the equator. This is accounted for by the rotation of the earth. As the earth revolves from west to east, the envelope of air surrounding it travels with it at about the same speed. Now if a particle of air starts from the north polar region toward the equator, it will have an eastward velocity equal to that of the spot from which it starts; but as it moves toward the equator, it will pass over earth surface that will have constantly increasing velocity. The particle of air will fail to take up entirely this increased velocity and, lagging behind, will join with like particles to form a wind from the northward and eastward. In other words, it will be continually diverted to the right as it moves southward.

On the other hand, a particle starting from the equator northward will have the eastward velocity of the earth at the equator, and as it moves northward it will outrun the more slowly moving surface of the earth over which it passes. Thus the particle will be diverted to the right. So with every particle of air in the northern hemisphere, no matter in what direction it is moving, except due east or west, it will have some tendency to turn to the right. When air flows in from all directions toward a low, the tendency for each particle to turn to the right causes a swirling motion. The opposite direction holds in the southern hemisphere, and the left-handed swirls are formed there.

AQUEOUS METEORS

Fog.—The chief cause of fog consists in the moist soil being at a higher temperature than the air. The vapors ascend, condense in the cooler air and become visible. The air must in all cases reach the point of saturation before condensation takes place. A current of hot and moist air passing over the surface of water cooler than itself will produce a fog.

The distinction made between fog and mist is one of degree only.

An interesting fact in connection with fog was discovered by a physicist named Aitken, viz., that aqueous vapor will not condense unless there is some liquid or solid present upon which it can be deposited. This was shown by passing steam into filtered air. It remained quite colorless, while steam passed into unfiltered air produced turbidity. In the upper regions of the air the gaseous ions which are always present serve as nuclei on which the aqueous vapors will condense.

Clouds.—There is no difference between fogs and clouds. Fogs are clouds resting on the ground. As a general thing, the height of clouds is greater during summer than in winter.

Various theories have been advanced in explanation of the suspension of clouds in the atmosphere, but the most generally accepted theory is that the clouds are falling continually. The lower part is continually dissipated by coming in contact with the lower and more heated atmosphere. At the same time, the upper part is always increasing from the condensation of new vapor, so that from these two actions the clouds appear to retain the same height.

Rain.—When the individual particles of vapor become larger and heavier from the condensation of aqueous vapor, they finally unite and form drops which fall as rain. Mountains are abundant sources of rain because they force the heated currents of air to flow upward, where they produce a condensation of vapor. If the rain-drops traverse moist air, they will, from their lower temperature, condense aqueous vapor and increase in volume. If, on the contrary, they pass through dry air, the drops tend to vaporize, and less rain falls. In some cases the drops vaporize completely, and the rain does not reach the earth.

The earth's attraction should cause the drops to fall with increasing velocity, but the resistance of the air causes the velocity to become constant.

Aqueous vapor is a powerful medium for absorbing and radiating heat, its absorption and radiation being 16,000 times as great as that possessed by dry air. This radiative power is thought to be the main cause of the torrential rains that fall in the tropics. The absorbent power of aqueous vapor is of the greatest importance. In dry air the radiation of heat from the earth at night is so rapid as to cause intense cold. In some parts of the Sahara Desert radiation has been so rapid at night as to cause the formation of ice. The radiation which aqueous vapor absorbs most readily is of the kind emitted from sources of low temperature; it allows the solar rays to penetrate our atmosphere with little loss, but after warming the earth these rays cannot retraverse the atmosphere. The aqueous vapor thus acts as a blanket to protect our vegetable life. If it were removed for one night, all plants capable of being destroyed by a freezing temperature would perish.

Dew.—Dew is aqueous vapor which has condensed on bodies during the night in the form of minute drops. The nocturnal radiation of heat from the earth lowers its temperature to the point where the vapor will condense. A cloudless sky is a cause of increased formation of dew. The earth radiates very rapidly and becomes cooled quickly. If there are clouds, however, their temperature is higher than that of the planetary surfaces; they radiate toward the earth and little chilling is experienced.

A gentle breeze increases the deposit of dew by continually bringing fresh air into contact with the cold surfaces to deposit its condensed vapor. A strong breeze will, however, produce a surface heat by friction, and will not allow the air time to be cooled.

Frost.—Frost is nothing more than dew which has been deposited on bodies cooled below the freezing-point, and has thus become frozen.

Snow and Sleet.—These are nothing more than water which has become frozen into crystals.

Hail.—Hail is a mass of globules of ice, each globule formed around a compact core of snow, and ranging in size from a pea to an egg. The formation of hail is due to the strong ascending currents of air, such as whirlwinds with their axes nearer the horizontal than the vertical. The falling particle of snow is carried upward to the cooler regions where the water on its surface is frozen. It becomes heavier and falls until again forced upward by the ascending current. It is thus driven alternately through hot and cold layers; water settles on it in the hot and is frozen in the cold. When it becomes too heavy for the air current to support, it falls to the earth.

LUMINOUS METEORS

The most frequent and the most interesting luminous phenomena are those produced by free electricity in the atmosphere. Benjamin Franklin first established a parallelism between electricity and lightning. By the instruments devised by various physicists it has been determined that the atmosphere at all times contains free electricity, usually positive, but occasionally negative. One investigator, Palmieri, states that the occurrence of negative electricity in the air is a certain indication that within 40 miles it either rains, snows or hails. The greatest amount of electricity is observed when the barometer is highest. Many hypotheses

as to the cause of electricity in the atmosphere have been propounded by different investigators, but none of them have progressed beyond the stage of conjecture.

Lightning.—Clouds are in general electrified, but there is a great difference in potential between the different clouds. When this difference of potential becomes so great that the resistance of the atmosphere is overcome, a discharge occurs, in the form of lightning, accompanied by a dazzling light. Sometimes this discharge occurs between clouds, and sometimes between a cloud and the earth. These flashes sometimes attain a length of five miles, and generally describe an irregular path. The great resistance offered by the air to the passage of an electric current causes it to follow the path of least resistance. In a vacuum electricity would pass in a straight line. In general, the discharges between clouds take the form of sheet lightning, while the discharges between a cloud and the earth describe a zigzag path, due to the differences in density of the air.

The duration of a lightning flash has been determined by Wheatstone as less than the millionth part of a second. Since the full effect of any light is produced on the eye only when its duration is at least one-tenth of a second, it follows that a landscape continuously illuminated by a lightning flash would appear 100,000 times as bright as it actually does.

Heated air conducts better than cold air. This accounts for a large number of cattle being killed, in many cases by a single lightning flash. They crowd closely together in a storm and a column of warm air arises from the group.

Thunder.—Thunder is the violent report which follows the lightning. Lightning and thunder occur simultaneously, but the difference in velocity of sound and light causes us to hear the thunder several seconds after seeing the lightning flash. Thunder is due to the fact that the lightning passing through the air causes it to expand with explosive violence and compress the surrounding air. This compressed air rushes in to fill the vacuum caused by the passage of the lightning, and, in turn, creates another partial vacuum, thus causing an alternate condensation and rarefaction that creates the wave motion which causes sound. The rolling sound of the thunder is due to various causes, one of which is the reflection of the sound from the earth, from other clouds, or from layers of air of unequal density.

The Rainbow.—The rainbow is the luminous phenomenon that appears in the clouds opposite the sun when they are resolved into rain. It is produced by the decomposition of the white light of the sun when it passes into the drops, and by its reflection from their inside faces.

CLIMATOLOGY

By the climate of a place is understood the whole of the meteorological conditions to which the place is subjected; in particular, its mean annual temperature, summer and winter temperatures, and the extremes within which these are comprised.

The temperature of the air on the surface of the earth in general decreases from the equator to the poles, but numerous local causes affect the temperature at different places, so that no general law can be deduced. The principal causes which modify the temperature are the latitude of the place, its altitude, the direction of the prevailing winds, and the proximity of the seas. The influence of the latitude is due to the greater or less obliquity of the sun's rays. Special currents in the seas, such as the Gulf Stream and the Japan Current, have a great influence on the climate of the countries whose shores they touch. The mild climate of the northwest of Europe is due to the influence of the Gulf Stream, just as the mild climate of our own northwestern states is due to the influence of the Japan Current.

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ON THE EMPLOYMENT OF TORPEDO VESSELS IN NIGHT SEARCH

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(*Rivista Marittima*, August, 1914)

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In a former article, I attempted to lay down some of the fundamental principles governing the tactical employment of torpedo craft.[1] The welcome accorded this article has induced me to continue the analysis of torpedo-boat operations.

The consideration that discovery of the enemy is a condition necessary to the tactical employment of these vessels leads me to turn my mind to the strategical side as well, which may be said to be the first phase of every warlike action, perhaps the most complex, the least accessible to systems of calculation, intimately connected with tactical action, and not capable of being considered by itself alone without taking into account also the tactical requirements, which are the final aim toward which everything should tend.

There can be no doubt that there is as much need in strategic action as in tactical actions for guiding rules, whose application may take various forms; but they must not degenerate into hard and fixed laws not susceptible of being adapted to the special conditions of each individual case and to various circumstances.

The difficulty lies mainly in the comprehension of the problem in its true terms and in its different successive phases, in formulating it clearly and synthetically, and in determining its development by the proper application of the fundamental principles and the orderly and distinct classification of its various phases.

These principles are neither new nor generally unknown; but, notwithstanding this, there is apparent a noteworthy lack of

[1] See *Rivista Marittima* for May, 1910.

direction in methods of application, in appreciation of opportunities, in standards of relativity, etc., the result of which is the confusion often manifested in practice and the lack of homogeneity in thought generally encountered in argument, which may easily lead to illogical systems and unreasonable undertakings.

Strategic analysis must be the basis for the study of every warlike problem. But every operation of war presents too many unforeseen elements to be confined absolutely within the narrow bounds of a pure and exact science; an infinity of complex and multiple causes, of reflex actions, may constantly alter conditions. Facts do not always develop in the way we have been led to expect.

Hence, it will be understood how the system of inferences, unless sufficient account is taken of the phenomenon under consideration, may induce us to follow the beaten path of the simplest and most attractive conditions, without giving sufficient weight to the fact that there may, in reality, exist very slight causes, difficult of appreciation, apt to have considerable effects, perhaps the opposite of those expected. Besides, in practice, it is sometimes natural to assume simple causes in order quickly to reach a mathematical solution, avoiding the trouble produced by those which are too numerous or complex; and we are induced to assign fixed values to factors which are essentially variable, so that they may become terms in an ordinary system of calculation, which leads to solutions which are incorrect, since based upon inadmissible hypotheses. Only analysis of the development of actual facts can, in each particular case, give a proper understanding of what is admissible and of the connection between cause and effect.

But we must not, on this account, think it best to trust entirely to the inspiration of the moment, abandoning every system of preparation founded upon study and logic. Inspiration does not come to the ignorant, and mental preparation is quite as necessary as material.

This abstract digression of mine tends to show the value of having a clear understanding of the conditions of the different phases of the problem, and of considering some simple general rules which, studied in their entirety, may clear away a little the fog of complexity, reduce the number of factors to be considered, and enable us to find the best solution for each case.

With this brief warning, I propose to point out and analyze the various successive phases of the night search, to reduce to simple synthetic terms the fundamental principles upon which this strategic study is based, to formulate them clearly, and define them in their essential spirit.

The general problem of the night search, with the object of delivering torpedo attack, consists in: Finding the enemy during the night hours, when it is known that he was sighted at a given point at a given preceding hour, or that he left a given point at a given time.

In the general cases of search, there are not sufficient data to insure certainty of results; however, there cannot be complete ignorance, since this would preclude the possibility of making any estimate, and it would be necessary to trust entirely to chance. Hence, it must be assumed that there are at least some data available which limit the area of uncertainty.

But if it is not always posible to find a general mathematical solution for such a problem, which, by its very nature, admits of mathematical solution only in special cases, on the other hand it is not logical to rely upon chance meetings only.

Therefore, as a matter of principle: The search should not be undertaken except when there is sufficient probability of success, without being reduced to looking for a needle in a haystack, since it is always logical to avoid every useless effort and loss of time; and it must also be assumed that there are cases where it is expedient to await until the enemy reveals himself of his own accord. The search, as a matter of principle, must not be regarded as a systematic operation which is to be applied under all circumstances, but only as that operation which can give good results in certain particular cases, when carried out within sufficiently restricted areas. Such cases may be found especially within the narrow confines of our seas.

The search problem must be considered essentially a problem in probability, and therefore it presents two principal phases for study, which are separate and distinct. The first, which may be said to be metaphysical in character, establishes and legitimizes the fundamental hypotheses; the second, rational in character, applies to these hypotheses the rules and methods of mathematics. Analysis of probable cases and of different degrees of probability is the basis of the search problem.

It is evidently impossible to lay down fixed rules for the solution of cases which are independent of one another and equally likely and probable; nor can they be defined mathematically. Notwithstanding this, they are certainly not entirely arbitrary, but escape mathematical analysis, contain something not accessible to ordinary systems of evaluation, and must therefore be established by close investigation and assumed as fundamental conventional data in each particular problem.

Under any circumstances, however, there exists one necessary condition, viz.: Our inferences can be considered correct only when we are considering cases absolutely independent of one another and equally probable. It would not be reasonable and correct to apply the rules of probability when this necessary condition is absent.

So far as concerns estimation of the equally probable, it may be said to be almost conventional, and, as such, is to a certain degree subjective and arbitrary, although there always exists a certain scale among the different hypotheses by which we may distinguish between those which present greater reasons for being considered justified and those which are to be considered wholly improbable.

It is certainly not always simple or easy to make such distinctions, and just here lies the major difficulty of the problem.

This is a broad field for profound study, which must always be undertaken with one fundamental principle in view: That every decision must be based upon the most probable objective of the adversary.

The essential factors from which the fundamental hypotheses must be derived may, in the most general cases, be reduced to the following:

(1) Information of the initial movement of the enemy.

(2) Information of the constitution of the enemy's forces.

(3) Information of the hour of his departure or of being sighted.

(4) Information of his probable immediate objective.

The adversary will not develop his operations hap-hazard, but will follow definite aims. Thanks to this principle, we may, within certain limits, infer the objective of a naval force from the hour of its departure. Important inferences may be drawn from the maximum distance the enemy can cover during the night hours, from the importance and constitution of his forces, from

the fact that the latter may indicate attacks against land positions or against mobile forces, or the avoidance of encounters at sea, etc.; from the interest he may have in remaining exposed a greater or less time by day or by night, in following the shortest routes or in deviating from them, in proceeding with compact or scattered forces, in steering for the nearest port or otherwise, etc.

It will be understood how, from a study of these facts, we may set the limits of the enemy's speed, the area which contains his equally probable courses, and even, perhaps, the hour of his departure or arrival.

Such an analysis tends to reduce the uncertainty within definite limits, to determine those factors susceptible of evaluation, and assumes enormous importance in practice.

The night search has all the character of a pursuit, and aims at the attack upon the enemy which should be delivered under cover of night. Hence it follows that the discovery must not only occur at night, but also that it must take place sufficiently early to allow the development of the tactical operations during the hours of darkness. It is evident, then, that the longer darkness continues after discovering the enemy, the greater will be the possibility of repeating and prolonging the attacks.

Furthermore, boats which have delivered an attack are under the necessity of returning to a protected position, to their own base or to the parent ships, completing the return journey, according to circumstances, either under protection of darkness or even by full daylight, when the dangers to be feared are very slight.

Hence, in the carrying out of the search, we may distinguish two different phases: That of pursuit or chase, that is to say, the phase of receding from the point of departure; and that of retirement.

It will therefore be necessary to establish also, in each case, the number of hours, T, which may be devoted to the phase of pursuit.

These conditions set a minimum limit to the relative speed of approach toward the enemy in the direction requiring the longest time to reach him, so that, even in the most unfavorable case, there may exist the chance of discovering him within the limits of time established for the search. We shall call the minimum speed thus established the *fundamental relative speed.*

The search should be carried out by scouting over well-defined areas. Hence, the limits of the zone must be determined in connection with the maximum time T allotted to the phase of pursuit,

and this zone must be that in which the enemy must be, in the period of time allotted to the search.

The typical form of the zone in the most general case, in which equally probable courses of escape for the enemy are not limited to any sectors, is *TPAOBR*, shown in Fig. 1, in which *T* and *N* are the simultaneous initial positions of the torpedo vessels and of the enemy, respectively, and the circumference which limits the zone is the geometrical locus of the points whose distances from *N* and *T* are in a constant ratio *K*, equal to that between the component v_t of the speed v_s of the torpedo vessels (Fig. 3), which gives the displacement toward the enemy necessary to insure the minimum fundamental speed, and *V*, the maximum allowable speed of the enemy.

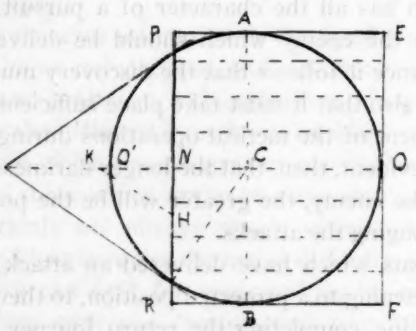

FIG. 1.

In fact, we know from geometry that the locus of the points whose distances from two fixed points bear a certain constant ratio to one another is a circumference passing through the two harmonic conjugate points of the fixed points, according to the given ratio.

As we know, the circumference is traced as follows: On the normal to *TN* passing through *N*, take the distance *NH* equal, on any scale, to v_t; with center *H* and radius *V*, cut *TN* at *K*; from *T*, draw the parallel to *HK* until it cuts the normal *NH* in *R*; the perpendicular to *TR* at the point *R* meets the normal *TN* in the point *C*, which is the center of the circumference sought, while *CR* is its radius and *O* and *O'* are the conjugate points.

The breadth of this typical zone depends upon the maximum allowable speed *V* of the enemy, upon the component v_t of the

scouting speed of the torpedo vessels necessary to insure the fundamental relative speed corresponding to the time T, and upon the distance D between the simultaneous initial positions of the enemy and the torpedo vessels.

Let us call the axis of this zone the maximum path TO, in the direction in which the relative speed of advance toward the enemy becomes a minimum, and which divides the typical zone into two symmetrical parts.

The maximum breadth L of the zone in a direction normal to the axis is represented by the diameter AB, normal to this axis.

The point O, the vertex of the zone, represents the limiting position requiring the maximum time to reach the enemy.

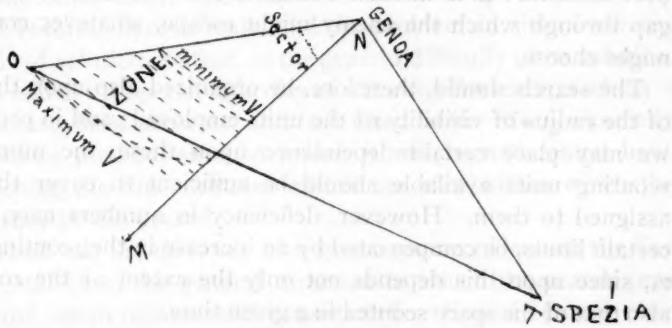

FIG. 2.

The zone in the special cases may be derived from the typical zone of the general case by suitable changes or reductions in the area, depending upon the special circumstances of the particular case.

Thus, Fig. 2 shows the zone in the case where the speed of the adversary assumes a minimum value below which he cannot fall, and his equally probable courses are limited to a given sector.

If, instead of knowing the position of the enemy N, simultaneous with the initial position T of the torpedo craft, we know the position corresponding to a certain antecedent instant, the zone may evidently be determined in the same way, but would be constituted of the whole of the circumferences corresponding to the extreme limiting positions which the enemy could have reached in the interval of time which elapses up to the instant corresponding with T; that is to say, corresponding to points of the circle

whose center is N' and whose radius is the space which the enemy could have passed over in this interval, at the maximum speed.

When the possible paths of the enemy are not all equally probable, it will evidently be necessary to lay out several zones which will include the different equally probable groups, and establish the order of probability according to which they may be classified.

Thus, at times, for example, the part TPR of the typical zone (Fig. 1), which includes possible routes of approach to the initial position T of the torpedo vessels, includes paths which are less probable than those situated in the rest of the zone.

A zone may be said to be completely and absolutely scouted when, during the period of search, the scouting has been extended over the entire area in such a manner as at no time to leave any gap through which the enemy might escape, whatever course he might choose.

The search should, therefore, be organized also upon the basis of the radius of visibility of the units employed; and in order that we may place certain dependence upon these, the number of scouting units available should be sufficient to cover the zone assigned to them. However, deficiency in numbers may, within certain limits, be compensated by an increase in the scouting speed v_s, since upon this depends not only the extent of the zone, but also that of the space scouted in a given time.

Besides, it is clear that when the adversary we are seeking is a naval force, the radius of visibility may be considered to be increased, owing to the greater space which he must necessarily occupy.

There are no limits to the course and speed of the enemy, other than those established by the hypotheses under which was determined the zone based upon the time of search. Discovery may therefore be equally probable at any point of the zone of search, and consequently the intensity of the scouting should be uniformly distributed over the whole extent of this zone, which may be subdivided into bands of such width that each may be left to the vigilance of one scouting group.

If by *scouting density* we indicate the ratio between the area over which an efficient lookout may be kept and the total area of the band, we shall have uniform scouting density and equality in probability of discovery when this ratio is the same for all the bands of the zone.

It is evident that, in different zones, corresponding to courses of varying degrees of probability, it will be logical to have different scouting densities, proportional to the degree of relative probability.

If the number of scouting groups is such as to allow of advancing toward the enemy with the necessary relative speed, and in such a manner that each group can completely cover its own territory with its own radius of visibility, and that the distance between different groups is always kept equal or inferior to the diameter of visibility, there would evidently be certainty of discovering the adversary, and the method of solving the search problem would be determined.

On the other hand, when such a number is not available, any method becomes approximate, and the problem admits of various methods of solution; so that, to the general difficulty of its solution, there is added the special difficulty of choosing the method which is the quickest, most accurate, and best fitted to the case—especially the quickest method, since, *à priori,* it will be understood how, by lessening the time, we also reduce the area within which the enemy may be discovered.

We shall call the *directrix* of a given system of search the line which establishes the general direction in which the search proceeds, and which represents the constant direction of advance over the surface of the scouted zone.

In establishing a method of search over a given zone, it is above all necessary to make certain that the adversary cannot escape beyond the limiting positions which it requires the maximum time to reach; hence, the scouting must proceed with the necessary speed toward the vertex of the zone in order to arrive at the most distant parts of the perimeter before the enemy, or, at least, simultaneously with him. From which we deduce: The directrix of the search should be the axis of the zone, or a line near it.

The paths which would lead the enemy to the periphery of the zone in the shortest time are the straight lines radiating from N.

But in the most general case, the adversary may also take up various speeds and follow irregular paths composed of alternate advances and retirements from his initial position; therefore, in order to reduce to a minimum the chance of his escaping, the search must cover the maximum possible area and perhaps proceed across the zone in an advancing line, forming an impassable

barrier, so maintained as to leave the smallest possible gaps at any time, and to keep the scouting density constant. Hence it will generally be necessary to establish suitable links between the different scouting groups, according to their relative positions, in order to be sure of having this uniform intensity of scouting across the zone at all times.

Therefore: The search should be carried out by distributing the various groups in a chain along an impassable advancing line of minimum length. Furthermore, the positions along this line must be such that they may be quickly reached, in order that the impassable mobile line can be formed from the start. Evidently, the only lines of deployment which satisfy these conditions are those lying near the normal to the axis, which can easily be reached simultaneously by courses radiating fanwise from the point of departure.

Hence: The normal to the axis fixes the general direction of the lines along which the forces should be deployed for the search.

It is clear, then, that the path of each scouting group within its own territory must be established in advance, in order to obtain proper co-ordination between the maneuvers of the various groups, and so that each group may know, at any instant, the corresponding positions of the others.

It must further be remembered that a good lookout calls for simple courses which do not require too much attention, and that the speed must be set at a limit not to be exceeded; and it will often be expedient to substitute for curved courses other straight ones which do not depart too much from them.

The paths to be followed by each group within its own territory should fulfil two conditions: They should give the necessary advance along the direction of the directrix; and, if the radius of visibility is not sufficient to cover completely the assigned territory, they must be such as to extend the lookout over the maximum area, that is, such that the ratio of surface effectively scouted to total surface shall be a maximum.

From this it might seem best, at first glance, that each group, within its own territory when conditions of speed allow, should follow courses inclined to the directrix in opposite directions, so as to keep within the limits of the assigned territory (Fig. 3), these courses including one or more periods of alternation, and being so executed as to maintain constant scouting density, that is,

so as to form an impassable mobile line, oscillating synchronously, and advancing with a speed v_t in the direction established by the directrix. We shall see, instead, that this system cannot be considered the best.

Having established all the above general conditions, which fix the rules under which the study of the solution of the search problem should be prosecuted, there remains only to pass on to the methods of translating them into action.

It seems to me that, in most cases in practice, the system which is simplest and which best fulfils all the necessary complex conditions may be that of considering a zone whose area is slightly different from that exactly defined by the circle of geometrical locus; substituting for this circle the rectangle $PRFE$ (Fig. 1) bounded by the outer tangents and the normal to the axis, PR; subdividing the rectangle into bands by lines parallel to the axis; establishing simple rectilinear courses for the different scouting

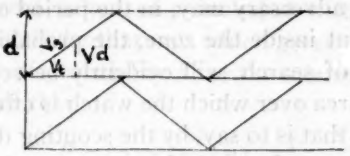

FIG. 3.

groups; and regulating the speed in the first tract so that the groups reach simultaneously the inner side PR of the rectangle, which constitutes the first completely developed mobile barrier line.

The tangent EF represents the limiting position of the moving barrier, upon reaching which the groups may, according to circumstances, either turn about or continue the search in a different manner.

Remembering that T is the maximum time established for the phase of pursuit, we evidently have

$$T = \frac{TO}{v_t},$$

and in the case of the typical zone,

$$\text{Axis} = TO = \frac{D \cdot V}{V - v_t},$$

from which we find, for the typical zone,

$$v_t = \frac{D}{T} + V,$$

and hence that v_t is inversely proportional to the time T.

Furthermore, in the typical zone, the length L of the line of deployment will be represented by the following expression:

$$L=2D\,\frac{v_t\cdot V}{v_t^2-V^2}=2D\cdot\frac{K}{K^2-1},$$

which shows that, given V and D, L will be a minimum when K—that is, v_t—is a maximum, which is when T is a minimum

Evidently, these formulæ refer to the general typical zone; and in the other cases the graphical solutions will be easier and more accurate.

When the breadth of the band d is equal to the diameter of visibility $2r$, the band may be said to be completely scouted; and in such case it is evident that the scouting courses should be straight lines parallel to the directrix of search, and the area scouted will be equal to the total area of the band.

If, instead, d is greater than the diameter of visibility, the area effectively scouted will be less than the total area of the band. In this case, since the adversary may, in the period of time T, be discovered at any point inside the zone, the probability of discovery P, for the system of search, will evidently be represented by the ratio between the area over which the watch is effectively extended and the total area; that is to say, by the scouting density.

Now, in the system of search for any zone determined, under the foregoing rules, by the time T and the scouting speed v_s, it is evident that the space effectively scouted is expressed with sufficient approximation by $2\cdot r\cdot v_s\cdot T$, while the total area of the band is $d\cdot v_t\cdot T$. Therefore, the probability of the system will be represented by

$$\frac{2\cdot r\cdot v_s}{d\cdot v_t};$$

and since, if n is the number of scouting groups,

$$d=\frac{L}{n},$$

we shall have

$$P=\frac{2\cdot r\cdot v_s\cdot n}{L\cdot v_t}.$$

When $v_t=v_s$, the search proceeds by direct routes parallel to the directrix; and we have

$$P=\frac{2\cdot r\cdot n}{L},$$

from which it appears that if

$$2\cdot r=\frac{L}{n},$$

we shall have $P=1$; that is to say, when the diameter of visibility is equal to the width of the band, the system is certain of success and the probability therefore becomes unity.

To sum up, analysis here shows that in every search problem D and V are fixed data, and thus also v_s, since it represents the maximum speed of aggression which may be assigned, and which, in the most general cases, cannot be abandoned; while T represents a maximum not to be exceeded, to which corresponds a minimum limiting value of v below which we must not drop. Hence, leaving the number n of groups out of consideration for the present, the only variable element is v, which, however, must always lie between the limits v_s and v_t, so that we may always have $v_t \leqq v \leqq v_s$.

It is clear that every change in v, corresponding to a proportional change in T, produces a double change; that is, in the breadth L of the zone and also in the space effectively scouted, $v_s \cdot T \cdot 2 \cdot r$.

The best solution among all those allowable, that is, corresponding to the different values of v included within the limits given above, will evidently be that one which gives the maximum value of the coefficient of probability P, or the scouting density.

It has been seen that

$$P=(2 \cdot r \cdot v_s \cdot n)\frac{1}{L \cdot v_t},$$

in which, still leaving aside n, the first factor, in parentheses, is constant; and therefore, P is a maximum when the second factor, $\frac{1}{L \cdot v_t}$, is a maximum.

But, in the case of the typical zone, we have found

$$L=2 \cdot D \cdot V \frac{v_t}{{v_t}^2-V^2},$$

in which $2 \cdot D \cdot V$ is constant, and therefore the maximum value of the expression $\frac{1}{L \cdot v_t}$ will correspond to the maximum for the other,

$$\frac{{v_t}^2-V^2}{{v_t}^2}=1-\frac{V^2}{{v_t}^2},$$

which evidently becomes a maximum when v_t is a maximum; that is, when $v_t=v_s$.

Evidently, the value of L in the cases of zones which differ from the general typical zone but are derived from it, will be different

from, but proportional to, the value for the typical zone, or else will be found from the latter by a system of inferences which is always the same, so that, even in such a case, the maximum of the factor under consideration will always occur under the same circumstances.

This leads us to affirm the principle that: The system which gives the greatest chance of success in the night search is that of straight courses, parallel to the directrix of the search, at maximum scouting speed; and that the suitability of adopting the system of alternating courses should always be rejected.

The system of straight courses is evidently the quickest, and therefore the best also, from the standpoint of tactical requirements, since it gives the maximum time for the tactical operations, reduces to a minimum the width of the search zone, and may therefore, in some cases, permit of a reduction in the number, n, of groups; that is to say, in the dispersion of the tactical units.

Up to now, we have always left out of consideration the number, n, of scouting groups, which may also be varied within given limits, depending upon the number of units available. Hence, there immediately arises the problem of the best manner of using the number of torpedo vessels available, in order that there may be the greatest chance of success in both discovering the enemy and in attacking him.

The breadth of the elementary tract, d, depends also upon the number of scouting groups, n; so that, viewed from this angle, there should be as many boats as possible available for the search. In other words, the search itself requires dispersion of the available units, while it is a known fact that the tactical action calls for simultaneity and, therefore, concentration of the units.

It may therefore be said that the operations of search and of attack, generally speaking, call for arrangements which are diverse and antagonistic; and for this reason the best solution should represent a just compromise between these different requirements.

We must, however, never lose sight of the fact that the search is only a necessary means to an end, an operation preparatory to tactical action, which is the final aim, but which cannot be reached without discovery of the enemy.

It is quite true that search and attack are successive operations; and, for this reason, in order to reconcile the opposing requirements, there might arise the idea of a first phase of dispersion for

the search, and a succeeding phase of concentration for the attack, after discovery of the enemy. In practice, however, we cannot rely sufficiently upon assembly by night, which cannot be safe and sure, is often executed with the greatest difficulty, and may easily result in confusion and other serious inconveniences.

Hence, it is may be stated that, as a rule, it will never be expedient to go beyond a certain limit in subdividing the forces, in the hope of covering the entire area of search, since this would really mean paying more attention to the discovery of the enemy than to the success of the attack.

The best method of harmonizing the diverse requirements is undoubtedly that in which the unit tactical group is kept intact; that is to say, that in which the scouting group is composed of one or more groups of tactical units. The chance of doing this rarely occurs in practice, and there arises the necessity of determining the best degree of subdivision, giving due weight to the diverse requirements of search and attack.

The most logical solution must be such as to give equal chances of success for the discovery and attack. It would certainly not be easy to find a complete and exact solution, and we must therefore discover an approximate rule which shall have a good logical basis and give a just degree of approximation.

It seems to me that the best and simplest solution, in most cases, might be sought by considering the rules of relativity in respect to the normal conditions of attack with the complete unit tactical group and those of completely effective search. In other words, if the number of scouting groups necessary to absolute efficiency, represented by $N=\frac{L}{2r}$, is greater than the number, A, of unit tactical groups available, we may adopt a number, n, equal to N reduced in a certain proportion; and, similarly, in order to obtain this number of scouting groups, each unit tactical group may be subdivided in the same proportion.

Indicating by c the common coefficient of reduction, we should have

$$n=\frac{N}{c}.$$

Reducing the number of units forming each unit tactical group in

the same proportion c, we should evidently have $A \cdot c$ new groups, and therefore we shall have

$$\frac{N}{c} = A \cdot c,$$

whence

$$c = \sqrt{\frac{N}{A}},$$

and therefore

$$n = \frac{N}{c} = \sqrt{N \cdot A}.$$

Evidently, then, since the single unit is indivisible, according to the conditions of the different cases, this subdivision in practice may be applied in a general manner to all unit tactical groups, or else may be limited to some groups only; also, if the number found is fractional, it would be necessary to take the next higher whole number.

Under any circumstances, however, remembering what was said, in the article mentioned, upon the tactical employment of torpedo craft, it seems to me that the unit tactical group must not be split into more than two parts; that is to say, that, at the very least, the scouting group must be the section, since by carrying the subdivision further, the chances of success in the attack would become too slight.

Hence, it may be stated that: The most rational subdivision is that corresponding to equal coefficient of reduction applied to the requirements for absolute efficiency of search and normal efficiency of attack carried out with the complete tactical unit; but, under any circumstances, the limit of subdivision allowable must be considered the section.

Summing up the results of the analytical considerations set forth up to now, it may be stated that the different phases for study in the typical problem may, in their most general terms, be conceived and formulated by proceeding successively in the following manner:

(1) Establish the fundamental hypotheses and reduce the uncertainty to definite limits, thus determining the maximum allowable speed of the adversary, the space which may include his equally probable paths, the initial distance and the initial positions of the torpedo vessels and the adversary, the maximum scouting

speed for the torpedo craft, the maximum time T to be allotted to the phase of pursuit in the search, and the radius of visibility of the scouting groups.

(2) Trace the zone and the line of deployment corresponding to v_s; that is, to the maximum scouting speed that can be assigned.

(3) Find out whether the problem admits of a normal solution; that is, whether $\frac{OT}{v_s}$ is equal to or less than T, maximum allowable time for the phase of pursuit.

(4) Find out whether the number A of unit tactical groups available is equal to, greater, or less than $\frac{L}{2r}=N$. If it is less, find the best limit of subdivision by the formula $n=\sqrt{N \cdot A}$.

With these data determined, it is evident that there can be no further doubt as to the best practical method of solving the problem.

In conclusion, it seems to me that it may be said that the rules cited above may be considered sufficient to indicate the manner in which the best solution of the general search problem can be studied.

By means of the principles enunciated, limits are drawn within the vast field of considerations, some fundamental requirements are well defined, and there is shown the general direction to be followed in the analysis of operations; but the interpretation of the general laws and their application to the various special cases will always depend upon individual ability.

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APPENDIX I

THEORY OF SIMILITUDE OF AERIAL PROPELLERS, WITH A PRACTICAL APPLICATION TO A GIVEN MOTOR AND AEROPLANE

By ASSISTANT NAVAL CONSTRUCTOR J. C. HUNSAKER, U. S. Navy

The application of a propeller, which has been found satisfactory in service or on tests, to a new design, where its conditions of operation are not identical, is based on the theory of mechanical similitude. The complete theory cannot always be satisfied by the designer, and where approximations are made it is necessary to examine the fundamental equations to appreciate the factors that have been neglected.

The force exerted by a fluid upon any solid body moving through it is known to depend on the following quantities:

l=a linear dimension giving the size of the object in a series of geometrically similar objects.

ρ=the density of the fluid.

μ=the viscosity of the fluid.

v=the relative velocity.

S=the velocity of sound in the fluid, which is a measure of its compressibility.

In fundamental units of mass, length and time the dimensions of these quantities are:

$$l=L,$$

$$\rho=\frac{M}{L^3},$$

$$\mu=\frac{M}{LT},$$

$$v=\frac{L}{T},$$

$$S=\frac{L}{T}.$$

The force exerted F must have the dimensions of a force, or a mass times an acceleration. Thus.

$$F=\frac{ML}{T^2}.$$

It is found experimentally that the force exerted by a fluid on a solid, neglecting viscosity and compressibility, is given by

$$F=K\rho l^2v^2,$$

where K is a constant depending on the shape of the body and its attitude. It is seen by reference to the dimensional relations above that this expression has the dimensions of a force.

To take account of viscosity and compressibility, additional factors may be introduced, provided they be of such form that the dimensional quality of the equation is unchanged. In other words, these factors must be pure arithmetical multipliers and dimensionless.

In the most general case, we may write $F=l^2v^2f(\mu, S)$, where f is an unknown function of the two variables μ and S. This expression violates our fundamental dimensional relation. It may be corrected only by introducing ρ, l and v in proper form into the function. As suggested by Lord Rayleigh,* let us write:

$$F=\rho l^2v^2f\left(\frac{\mu}{\rho vl}, \frac{S}{v}\right),$$

where f is an unknown function of the two variables indicated. It is convenient to introduce the quantity ν, the kinematic viscosity of the fluid, defined by

$$\nu=\frac{\mu}{\rho},$$

and to rewrite our equation:

$$F=\rho l^2v^2f\left(\frac{\nu}{vl}, \frac{S}{v}\right).$$

It is seen that the quotients $\frac{\nu}{vl}$ and $\frac{S}{v}$ are dimensionless and hence any function of those quantities is dimensionless. Hence the whole expression for F is of the dimensions of a force and is correct in form.

* Technical Report of Advisory Committee for Aeronautics, 1909-10, pages 33-38.

Since the form of function f is unknown, we may ignore its effect if the conditions of the problem can be arranged to keep $\frac{\nu}{vl}$ and $\frac{S}{v}$ constant, for then the function is a constant. To preserve $\frac{S}{v}$ constant, since S, the velocity of sound, is constant for a given fluid, the relative velocity v must be kept constant. In testing model propellers, this is accomplished by running the model at the same speed of translation as the full-size propeller and at the same tip speed.

For speeds which do not approach the velocity of sound, the effect of compression is usually ignored. This is the case for ordinary aeroplane speeds. For an 8-foot propeller, turning 1300 revolutions per minute, the tip speed is nearly half the velocity of sound in air—1120 feet per second. In this case, some allowance might be made for compression, but in neglecting it no very great error is made. For rifle bullets, on the other hand, the compression of the air plays an important part in the resistance equation. For practical purposes of design of aeroplanes and propellers, it is customary to neglect the effect of changes in $f\left(\frac{S}{v}\right)$.*

The term involving viscosity gives the frictional resistance, or viscous drag on the surface of the solid. For smooth fish-shaped bodies of approximate stream-line form, the motion is not turbulent and the greater part of the resistance is frictional. The same result is found for the resistance of fine ships in water. Since viscosity and density are constant for a given fluid, to make $\frac{\nu}{vl}$ constant, vl must be constant, or the speed must vary inversely as the size. Careful account of this fact is taken in design of hulls of dirigibles from tests on small models. The truth of the effect on frictional resistance of the fraction $\frac{\nu}{vl}$ was verified experimentally by Osborn Reynolds in 1884, and since by Dr. Stanton † in England and Dr. Prandtl in Germany.‡

*F. H. Bramwell, "Propellers," Aeronautical Journal, p. 104, London, April, 1914.

†Technical Report of the Advisory Committee for Aeronautics, 1911-12, pages 41-44.

‡Zeitschrift für Flugtechnik und Motorluftschiffahrt, May 16, 1914, Mitteilungen aus der Göttinger Modellversuchsanstalt, pages 140-145.

For unsymmetrical bodies such as an aeroplane wing or propeller blade, stream-line flow is replaced by discontinuity, and turbulence results, with the consequent generation of eddies and vortices. In this case, the resistance is largely due to setting up motion in fluid which was originally at rest. The momentum or kinetic energy imparted to the fluid is a cause of resistance and must obviously depend on its density, the volume of fluid affected and the speed imparted. Experiments show this resistance to be given by an expression of the form $F = K\rho l^2 v^2$, with notation as above.

Frictional resistance is added to the above inertia resistance, of course, but in practice it is found that the effect of friction is so slight that it cannot be measured on ordinary laboratory instruments. Hence, the multipler K is nearly a constant for the type of discontinuous motion considered. The error in neglecting the effect of viscosity may be as much as 5 per cent for a propeller blade, but probably not more.

If, then, we neglect friction, as being important only for symmetrical objects of easy form, and neglect compression of the air as being only of importance for velocities near and above that of sound in air, we are left with an expression for the force exerted by the air on an element of a propeller blade of the simple form

$$F = K\rho l^2 v^2.$$

The acceleration of gravity has purposely been left out of this discussion, as it is considered that the motive force is an external agent such as a gasoline motor, and hence quite independent of gravity. Also the object is completely submerged in the fluid and gives rise to no surface waves as is the case for a ship.

The consequence of acceptance of the above expression independent of gravity is that there is no need of a search for "corresponding speeds." The forces for any size and speed can be predicted from the forces on a geometrically similar object in a similar attitude at some other speed. Naturally, we should make the reservation dictated by common sense that sizes and speeds considered should be of the same order of magnitude. By this restriction, errors made in ignoring viscosity and compressibility are reduced to a minimum.

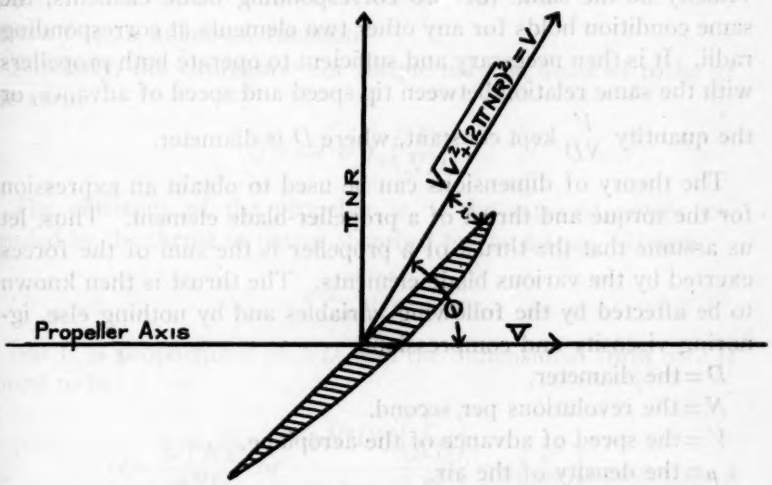
APPLICATION TO A PROPELLER BLADE

Granted that the force on a solid object giving rise to discontinuity and turbulence in a fluid medium is of the form

$$F = K\rho l^2 v^2,$$

we may consider the conditions under which this expression may be used for the study of propeller action.

The quantity v is the relative velocity of fluid and object. In the case of an element of a propeller blade, the relative motion between that element and the fluid at rest is composed of one component equal to the speed of advance V of the aeroplane, and a second component at right angles to it, equal to the linear velocity of rotation of the element.



SECTION OF PROPELLER BLADE, SHOWING COMPONENTS OF VELOCITY

Let N be revolutions per second and r the radius of the blade element considered. The relative velocity of the wind and blade element is then $\sqrt{V^2+(2\pi Nr)^2}$ and its direction makes an angle θ with the trajectory equal to $\tan^{-1}\frac{2\pi Nr}{V}$. The blade must then be given such a pitch or twist that the blade face receives this air at a small angle i which is analagous to the angle of incidence for an aeroplane surface. For marine propellers this angle is known as the *slip angle*. The force of the air on a blade element will then have a component in the line of flight giving thrust and a component at right angles producing torque. The relation

between these two forces is characteristic of a given propeller working under given conditions. If a propeller of different size be desired to work under similar conditions, its rotational speed and velocity of advance must be adjusted to give the same slip angle on corresponding elements of the two propellers. Since the propellers may be made geometrically similar, the slip angle will be unchanged if the direction of the relative velocity of the air is unchanged. The direction of the relative velocity of each element is given by the angle θ defined above as

$$\tan\theta=\frac{2\pi Nr}{V}.$$

From conditions of similarity, it follows that if the relative velocity be the same for two corresponding blade elements, the same condition holds for any other two elements at corresponding radii. It is then necessary and sufficient to operate both propellers with the same relation between tip speed and speed of advance, or the quantity $\frac{V}{ND}$ kept constant, where D is diameter.

The theory of dimensions can be used to obtain an expression for the torque and thrust of a propeller-blade element. Thus, let us assume that the thrust of a propeller is the sum of the forces exerted by the various blade elements. The thrust is then known to be affected by the following variables and by nothing else, ignoring viscosity and compression.

D=the diameter.

N=the revolutions per second.

V=the speed of advance of the aeroplane.

ρ=the density of the air.

θ=the direction of relative motion of a blade element.

The expression for thrust must be a combination of these variables such that the result has the dimensions of a force, $\frac{ML}{T^2}$.

From experience, we know that thrust is increased directly as density, as the area of the blades and as the square of the relative velocity. The latter is to be a function of the tip speed and proportional to ND. To write a dimensional expression we may try $T=K\rho N^2D^4$ in which we see that since N is of the dimensions $\frac{1}{T}$, the expression for thrust reduces to

$$T=K\times\frac{M}{L^3}\times\frac{1}{T^2}\times\frac{L^4}{1}=K\frac{ML}{T^2}.$$

This has the correct dimensions of a force. The effect of slip or direction of relative motion has not yet been introduced. The direction of relative motion at any point was shown above to depend on

$$\frac{V}{ND} = \frac{L}{T} \cdot \frac{T}{1} \cdot \frac{1}{L} = 1.$$

It is hence dimensionless and can be introduced in any function into the general expression for thrust without disturbing the dimensional relations.

We then have in the most general case:

$$T = \rho N^2 D^4 f\left(\frac{V}{ND}\right),$$

where f is an unknown function.

Similarly, the expression for torque may be deduced to be of the form

$$Q = \rho N^2 D^5 f_2\left(\frac{V}{ND}\right).$$

The efficiency of the propeller, e, is the ratio of power expended by the thrust to power absorbed by the torque. Hence

$$e = \frac{TV}{\pi NQ}.$$

But V is proportional to ND, and the dimensional form of e is found to be:

$$e = \frac{KTND}{\pi NQ} \text{ or } \frac{K\rho N^3 D^5 f\left(\frac{V}{ND}\right)}{\rho N^3 D^5 f_2\left(\frac{V}{ND}\right)} = \phi\left(\frac{V}{ND}\right).$$

The efficiency of a propeller, then, is a function of the slip, as is known from experience with marine propellers.*

* D. W. Taylor, Naval Constructor, U. S. Navy. "Recent Experiments at the U. S. Model Basin," November, 1904. "Model Basin Gleanings," November, 1906. Society of Naval Architects and Marine Engineers, New York.

Mr. Taylor tested in water several series of propellers of different diameters. For similar propellers, he found the efficiency to be a function of the slip alone, with only small discrepancies which might be attributed to the experimental errors. The theory of similitude for water propellers was found to apply so long as cavitation did not enter into the phenomena.

The proposed propeller which is to be used on a new design may be used at the same efficiency as the prototype, provided the relation $\frac{V}{ND}$ is kept unchanged.

The usual definition of slip for marine propellers is based on the rather arbitrary analogy between a propeller and a true screw. The face of the blade is given a helical surface, and no attention is usually paid to the back. The pitch of the screw is the pitch of the helix, and the slip s is defined by the expression $s=1-\frac{V}{pN}$, where p is the pitch. The geometrical pitch p of a blade is a linear dimension of the propeller and will increase with the diameter for a series of similar propellers. Hence, since slip as above defined depends on $\frac{V}{pN}$, it may be said to depend on $\frac{V}{ND}$. The virtual pitch of a screw with thick blades in general differs from the geometrical pitch and is only to be determined by experiment. Thus, if at speed V_0 and revolutions N_0 the propeller exert zero thrust, we say the virtual slip is zero, or

$$s=0=1-\frac{V_0}{pN_0},$$

or

$$p=\frac{V_0}{N_0},$$

the virtual pitch.

The difficulties of knowing the pitch, and hence the slip, of a propeller, are further complicated by the frequent use of a variable pitch, radial or axial.

By a rigid consideration of the conditions of similitude, it appears that there is no need to know the pitch as defined above. For geometrically similar propellers, it is sufficient only to know the ratio $\frac{V}{ND}$. For $\frac{V}{ND}$ constant, the slip is constant whether

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For air propellers, cavitation is not of interest, as the velocity pressure is only a few inches, against an atmospheric pressure of 33 feet of water.

The same conclusion may be reached from a perusal of the following propeller tests in air:

G. Eiffel, "La Résistance de l'air et Aviation," 1912.

G. Eiffel, Aérophile, June 15, 1911.

E. Dorand, La Technique Aéronautique, June 15, 1910; November 1, 1910; November 1, 1911.

real or virtual. It is proposed to call $\frac{V}{ND}$ a slip function out of deference to the time-honored propeller theory, and hereafter to avoid mention or calculation of slip or pitch as usually considered.

The action of a propeller is expressed by the following values:

Thrust $= T = \rho N^2 D^4 f\left(\frac{V}{ND}\right)$.

Torque $= Q = \rho N^2 D^5 f_2\left(\frac{V}{ND}\right)$.

Brake horse-power $=$ B.H.P. $= \pi QN = \rho N^3 D^5 f_3\left(\frac{V}{ND}\right)$.

Thrust horse-power $=$ T. H. P. $= TV = \rho N^3 D^5 f_4\left(\frac{V}{ND}\right)$.

Efficiency $= e = \phi\left(\frac{V}{ND}\right)$.

In general, it is seen that if two of the above are observed, the remaining three can be calculated, as they are dependent variables.

For purposes of design, it is convenient to consider the thrust in order to make it equal to resistance of the ship or aeroplane. The efficiency is convenient to consider in order to adjust our conditions to provide the most favorable conditions for working. If the thrust is satisfactory and the efficiency high, the problem is solved, for the power required may then be calculated, since it is known that the torque of the propeller will equal the torque of the motor.

The thrust given by a member of a family of similar propellers is shown above to be represented by

$$T = \rho N^2 D^4 f\left(\frac{V}{ND}\right).$$

It is proposed to separate the density ρ and the non-dimensional multipliers into a characteristic coefficient to be called a thrust coefficient.

Let $K_t = \rho f\left(\frac{V}{ND}\right)$,

then $T = K_t N^2 D^4$.

The thrust coefficient is determined for a series of values of $\frac{V}{ND}$ or slip function by experiment. From the data of this single test, we can predict the thrust developed by any other similar propeller by using the thrust coefficient proper to a given value of

slip function and substituting in the above equation. It is unnecessary to inquire about slip and pitch. The thrust coefficient is a function of the slip function, as is also the efficiency. It is necessary, then, to know the efficiency of a propeller at all values of the slip function, in order to predict the efficiency of another similar propeller.

At the University of Paris, a dynamometer car is propelled down a straight track by a full-size air propeller. Thrust and efficiency of a great number of propellers have been observed and published, and if a designer is fortunate enough to find one that fits his case he may copy it and proceed with confidence to disregard all propeller theory.

On the other hand, the designer is not often able to find a propeller that exactly fits his conditions. He may compromise then by running a propeller slower or faster than he would wish, and accept the loss of efficiency as unavoidable.

In aeroplane design, it is always necessary to fit a propeller that shall answer three independent requirements. First, the thrust must equal the resistance of the aeroplane at designed speed. Second, the torque of the propeller must equal the torque of the motor at full power; and third, since the motor develops full power at but one speed of revolution, the propeller must operate at those revolutions. It is, of course, possible to compromise with requirements two and three by the use of gearing or chains, but extra weight and complication are involved. A further restriction is that the propeller diameter must not be too great.

It is proposed to illustrate the theory of similitude, as developed above, by an application to a particular case.

APPLICATION OF PROPELLER SIMILITUDE

In the aeroplane design outlined in the body of this paper, the resistance at 90 miles an hour is estimated to be 335 pounds. To be on the safe side, let us require our propeller to give a thrust of 380 pounds. At this speed the Salmson motor can develop 125 B. H. P. at 1300 R. P. M. Let our propeller then turn at this speed. Further, let us have our propeller work at its maximum efficiency under these conditions. We can count on better than 75 per cent efficiency and, hence, better than 94 thrust horsepower. The power required at this speed is only 81.

The University of Paris in its report for the year 1913 gives the results of tests at the St. Cyr Laboratory on three propellers in which the maximum efficiency reached 80 per cent in each case. We can do no better than attempt to apply one of these propellers to our design.

It is first necessary to convert the published data into the form of thrust coefficient on slip function. For convenience the work is done in metric units.

The following tables show the calculation:

PROPELLER No. 6

Diameter 2.142 m. Pitch 1.43-1.55 m.
Tested at 1300 R. P. M. Two blades.
Observed thrust and efficiency.

$\frac{V}{ND}$	Efficiency e	Thrust at 1300 R. P. M. T	$\frac{T}{N^2D^4} = K_t$
.0	.0	180	.0187
.1	.18	169	.0176
.2	.35	156.5	.0163
.3	.51	142	.0148
.4	.65	127.5	.0133
.5	.78	90	.00937
.6	.80	85.4	.00888
.7	.70	43.2	.00449
.75	.0	0	0

PROPELLER No. 8

Diameter 2.596 m. Pitch 1.85-2.52 m.
Tested at 700 R. P. M. Two blades.

$\frac{V}{ND}$	e	T	K_t
.0	.0	153	.0229
.1	.15	151.5	.0227
.2	.30	150.0	.0225
.3	.44	145.0	.0217
.4	.57	137.5	.0206
.5	.67	128.5	.01925
.6	.73	116.0	.0174
.7	.77	102.5	.0154
.8	.80	87.0	.01305
.9	.78	71.8	.01077

PROPELLER No. 9

Diameter 2.90 m. Pitch 1.84-2.075 m.
Tested at 700 R. P. M. Two blades.

$\frac{V}{ND}$	e	T	K_t
.0	.0	180	.0187
.1	.18	171	.0178
.2	.36	157	.0163
.3	.51	142	.0148
.4	.64	128	.0133
.5	.73	110	.01145
.6	.79	88.2	.00918
.65	.80	....	....
.7	.79	63	.00656

As a check on the above, let us take the results of tests run at 600 revolutions per minute for the same propeller.

$\frac{V}{ND}$	T for 600 R. P. M.	K_t
.0	130	.0184
.1	123.5	.0175
.2	113	.0160
.3	103	.0146
.4	92.3	.0131
.5	79.3	.01125
.6	63.7	.00903
.7	45.5	.00644

The K_t is found to be in close agreement from the two calculations, with a maximum error of about 1.5 per cent.

The above values of thrust coefficient and efficiency are plotted on Fig. VIII with slip function $\frac{V}{ND}$ as abscissæ.

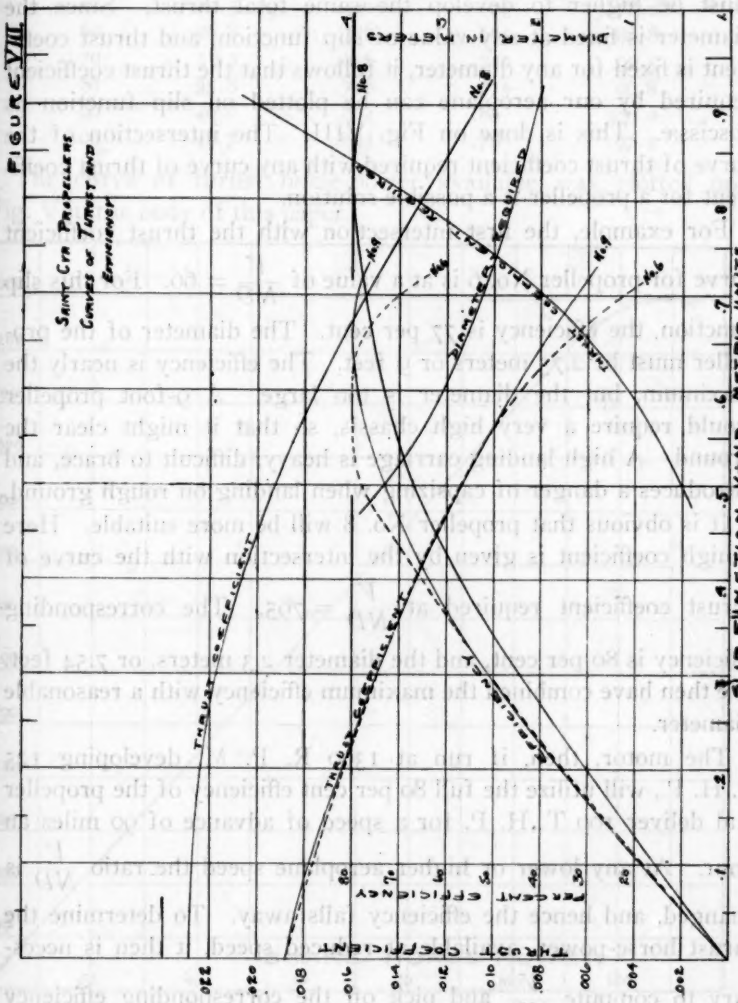
To return to our problem, we note first that we are limited to 1300 revolutions per minute by the motor, or $N=21.66$ R. P. S.

The propeller diameter is therefore fixed for a given value of slip function. Thus, for $s=\frac{V}{ND}$, $D=\frac{V}{21.66S}$; we may then compute the diameter appropriate to a series of values of slip function.

$s=\frac{V}{ND}$	D (meters)
.5	3.66
.6	3.05
.7	2.62
.8	2.29
.9	2.03

A curve of diameter in meters is plotted on Fig. VIII.

Regardless of diameter, the propeller by the conditions of the problem must develop a thrust of 380 pounds or 172 kilograms.



Also the speed of revolution is constant at $N=21.66$. The thrust at any slip function is:

$$T=K_tN^2D^4 \text{ or } K_t=\frac{T}{N^2D^4}=\frac{172}{21.66^2D^4}.$$

Hence, for a propeller of given diameter the thrust coefficient must be equal to a certain figure in order to produce the required thrust. Naturally, for smaller propellers the thrust coefficient must be higher to develop the same total thrust. Since the diameter is fixed at any value of slip function, and thrust coefficient is fixed for any diameter, it follows that the thrust coefficient required by our aeroplane can be plotted on slip function as abscissæ. This is done on Fig. VIII. The intersection of the curve of thrust coefficient required with any curve of thrust coefficient for a propeller is a possible solution.

For example, the first intersection with the thrust coefficient curve for propeller No. 6 is at a value of $\frac{V}{ND} = .66$. For this slip function, the efficiency is 77 per cent. The diameter of the propeller must be 2.75 meters or 9 feet. The efficiency is nearly the maximum, but the diameter is too large. A 9-foot propeller would require a very high chassis, so that it might clear the ground. A high landing carriage is heavy, difficult to brace, and introduces a danger of capsizing when landing on rough ground.

It is obvious that propeller No. 8 will be more suitable. Here a high coefficient is given by the intersection with the curve of thrust coefficient required at $\frac{V}{ND} = .795$. The corresponding efficiency is 80 per cent, and the diameter 2.3 meters, or 7.54 feet. We then have combined the maximum efficiency with a reasonable diameter.

The motor, then, if run at 1300 R. P. M. developing 125 B. H. P., will utilize the full 80 per cent efficiency of the propeller and deliver 100 T. H. P. for a speed of advance of 90 miles an hour. At any lower or higher aeroplane speed the ratio $\frac{V}{ND}$ is changed, and hence the efficiency falls away. To determine the thrust horse-power, available at reduced speed, it then is necessary to compute $\frac{V}{ND}$ and pick off the corresponding efficiency from the curve of efficiency on slip function.

For example, for full throttle opening, or motor turning 1300 R. P. M., the B. H. P. is constant at 125 H. P. The thrust horse-power available is computed as follows:

FULL POWER, 125 B. H. P. 1300 R. P. M. = 21.667 R. P. S.

V, miles per hour	Meters per second	$\frac{V}{ND}$	e	T. H. P.
45	20.1	.402	.57	71.2
50	22.3	.446	.625	78.0
60	26.8	.536	.695	86.8
70	31.3	.626	.740	92.5
80	35.8	.716	.775	96.8
90	40.2	.804	.80	100.0
100	44.7	.893	.78	97.5

The curve of thrust horse-power available was plotted on Fig. V in the body of this paper.

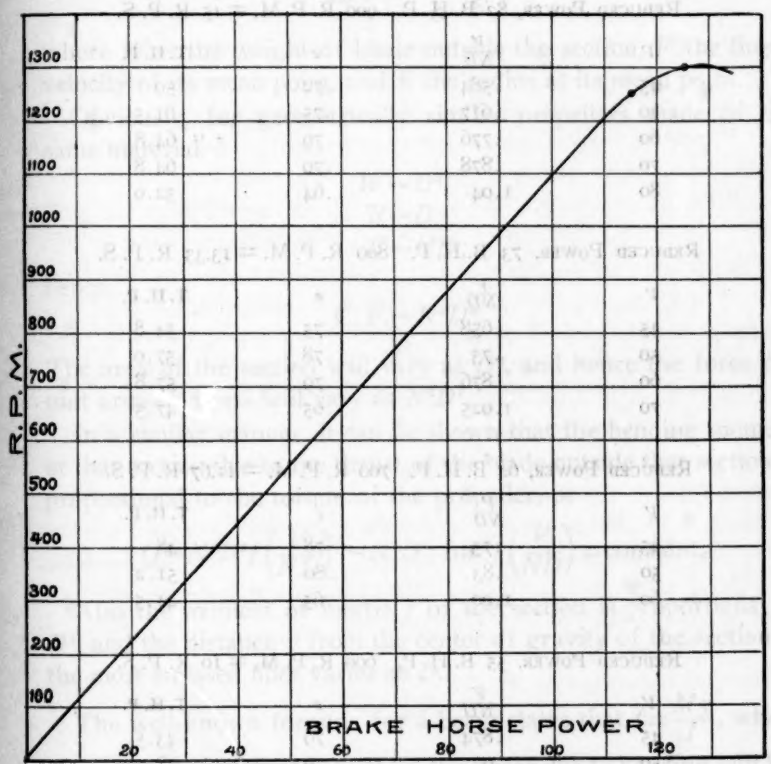


FIG. IX.—CURVE OF POWER-REVOLUTIONS FOR SALMSON MOTOR. RATED 120 H. P.

In a similar manner, any reduced throttle opening corresponds to a definite value of the B. H. P. This is determined from the power curve of the motor under consideration. For the Salmson motor the power-revolution curve is given on Fig. IX.

The calculation of power available for flight at reduced power is shown in the following tables:

REDUCED POWER, 91 B. H. P. 1000 R. P. M. = 16.67 R. P. S.

V, miles	$\frac{V}{ND}$	e	T. H. P.
45	.524	.69	62.8
50	.582	.72	65.5
60	.70	.77	70.0
70	.815	.80	72.8
80	.934	.75	68.0

REDUCED POWER, 82 B. H. P. 900 R. P. M. = 15 R. P. S.

V	$\frac{V}{ND}$	e	T. H. P.
45	.584	.72	59
50	.617	.75	61.5
60	.776	.79	64.8
70	.878	.79	64.8
80	1.04	.64	52.0

REDUCED POWER, 73 B. H. P. 800 R. P. M. = 13.33 R. P. S.

V	$\frac{V}{ND}$	e	T. H. P.
45	.658	.75	54.8
50	.73	.78	57.0
60	.876	.79	57.8
70	1.025	.65	47.5

REDUCED POWER, 64 B. H. P. 700 R. P. M. = 11.67 R. P. S.

V	$\frac{V}{ND}$	e	T. H. P.
45	.75	.78	48
50	.83	.80	51.2
60	1.00	.65	41.5

REDUCED POWER, 55 B. H. P. 600 R. P. M. = 10 R. P. S.

V	$\frac{V}{ND}$	e	T. H. P.
45	.874	.79	43.5
50	.97	.70	38.5

In each of the above cases, the power available for flight is plotted on Fig. VI above. It is to be noted that flying at reduced power may or may not be economical. If the propeller is designed for maximum efficiency at full speed and full power, running at

reduced power means running at reduced propeller efficiency, and no gain in radius of action can be counted on without a full knowledge of the variation of propeller efficiency.

In the above application of the theory of similitude attention has been directed to the aerodynamic side of the problem. Practically, it is necessary also to take account of the strength of the blade.

The centrifugal force at the root of a blade or at any section can easily be shown to be:

$$\text{C. F.} = \frac{W}{g}\frac{V^2}{R},$$

where W is the weight of blade outside the section, V the linear velocity of its mean point, and R the radius at its mean point.

Obviously, for geometrically similar propellers made of the same material,

$$W \sim D^3,$$
$$R \sim D,$$
$$V \sim ND;$$

hence,

$$\text{C. F.} \sim N^2D^4.$$

The area of the section will vary as D^2, and hence the force per unit area or stress will vary as N^2D^2.

In a similar manner, it can be shown that the bending moment at that section due to the thrust of the blade outside that section is proportional to the torque of the propeller, or

$$Q \sim N^2D^5 f\left(\frac{V}{ND}\right) \sim N^2D^5 \text{ for } f\left(\frac{V}{ND}\right) = \text{constant}.$$

Also the moment of inertia I of the section is proportional to D^4, and the distance y from the center of gravity of the section to the most stressed fiber varies as D.

The well-known formula for a beam states that $f = \frac{My}{I}$, where f is the stress. In the blade, then, the stress due to bending will be:

$$f = \frac{Qy}{I} \sim N^2D^2.$$

Hence, the combined stress due to centrifugal force and to bending is proportional to N^2D^2.

In the particular case in hand for the aeroplane, we use a diameter of 2.3 meters at 1300 R. P. M. The prototype had a diameter of 2.596 meters and was run at 700 R. P. M. The ratio

$$\frac{N_1^2 D_1^2}{N_2^2 D_2^2} = 2.7.$$

Our aeroplane propeller, if made of the same material as the model and geometrically similar, will be relatively weaker in the proportion of roughly one to three. The factor of safety in the original design is thus cut down to one-third. Since the centrifugal force and bending moment are important only for sections near the root of the blade, it is necessary to thicken up only those sections materially. However, such thickening of the root will have very little effect on the functioning of the propeller, as the major part of the work is done by the outer half of a blade.

It should be further noted that in very light propeller blades the distortion at high speeds is considerable and may have an important effect on efficiency. To preserve the same efficiency, a geometrically similar propeller must be run with N^2D^2 constant, so that the distortions, or the stresses which cause them, shall be the same. In our problem, we have neglected this consideration, and to this extent it is not valid to apply the method developed above to very thin blades run at high speed.

However, it is only fair in presenting a method to show the defects as well as the virtues. It is not contended that similitude gives an ultimate solution. But when used with discretion, it should furnish a fair solution, with every chance of being a better solution than that commonly resulting from the practice of the aeroplane inventor who tries different propellers on his machine and different motors until his perseverance is at last rewarded by getting his machine to leave the ground.

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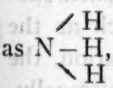
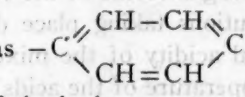
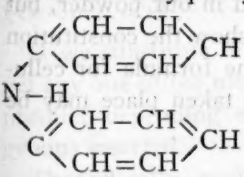
U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

DIPHENYLAMINE[1]

By LIEUTENANT W. W. BRADLEY, U. S. Navy

In the July-August issue of the PROCEEDINGS, under the heading "The Development of Our Navy's Smokeless Powder," Lieutenant Commander Earle briefly mentions that the substance diphenylamine is incorporated in all U. S. Navy smokeless powder now being manufactured. It would seem desirable that some little information regarding the character, properties, and object of this substance should be communicated to the service. The use of diphenylamine is not a trade secret, it having been used in Germany before being adopted in the United States. Since I am unable to find very much information regarding this substance in the recent numbers of the PROCEEDINGS, I am giving below a brief description of the material, its properties, its theoretical reactions, etc.

Diphenylamine, $(C_6H_5)_2NH$, is a secondary amine. It may be considered as an ammonia derivative, that is, as an ammonia in which two of the hydrogen atoms of ammonia (NH_3) have each been replaced by the phenyl group (C_6H_5). This is well shown by considering the structural formula of the substance itself and of its constituent parts. Representing the formula of ammonia as  , and that of the phenyl group as  , it is easily seen that, if we replace two of the hydrogen atoms of the ammonia by phenyl groups, we then have a structural formula  , which is diphenylamine, $NH(C_6H_5)_2$.

[1] The writer acknowledges the timely criticisms made by Mr. G. W. Patterson while this article was being prepared.

There can be only one diphenylamine, since the phenyl group is symmetrical and the structure of the ammonia molecule does not admit of more than one diphenyl derivative.

Diphenylamine melts at 54° C. and boils at 310° C.[2] It may be made by heating aniline hydrochloride with aniline at 240° C., according to the following reaction:

$$C_6H_5NH_2HCl + C_6H_5NH_2 = (C_6H_5)_2NH + NH_4Cl.$$

Aniline hydrochloride. Aniline. Diphenylamine. Ammonium chloride.

It is a weakly basic, light yellow, crystalline substance, readily soluble in alcohol, ether, acetic acid, benzene, carbon disulphide, etc., and almost insoluble in water. It has a pleasant odor when chemically pure, but the odor of the commercial diphenylamine now in use is decidedly unpleasant.

Diphenylamine is incorporated in the powder to act as a stabilizer. According to Webster, a stabilizer is "a substance added to an explosive to render it less liable to spontaneous decomposition." The use of diphenylamine is fully in accord with the above definition.

In order to illustrate the action of diphenylamine in stabilizing nitrocellulose powders, it will be necessary to consider the composition of several other well-known substances.

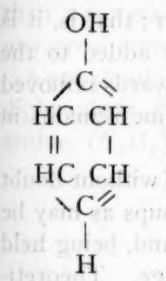
The cellulose used in the manufacture of powder has the formula $(C_6H_{10}O_5)_x$. Just what is the value of x has been a matter of some dispute, but, according to Vieille, it is 4, thus making the correct formula $C_{24}H_{40}O_{20}$.[3] During the process of nitration, the NO_2 groups of the nitric acid are substituted for the hydrogen atoms of the cellulose. The exact number of such substitutions taking place depends on various factors, such as the total acidity of the mixed acids used, the time of nitration, the temperature of the acids used, etc. The formula for a nitrocellulose of 11.96 per cent nitrogen content is $C_{24}H_{31}(ONO_2)_9O_{11}$. This is a lower nitrogen content than is used in our powder, but the formula answers as well as any other to show the constitution of nitrocellulose. By comparing this with the formula for cellulose, as given above, the changes that have taken place may be easily noted.

[2] Victor von Richter, Vol. II, p. 79.

[3] Guttmann, "Manufacture of Explosives," Vol. II, p. 62.

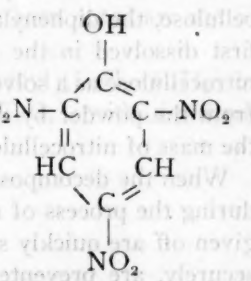
When a nitrocellulose powder decomposes through slow disintegration extending through months or years, so-called "nitrous fumes" are liberated. These fumes consist in part of a reddish brown gas known as nitrogen dioxide or nitrogen peroxide (NO_2), which is a powerful oxidizing agent. Such fumes act as a catalytic agent on the nitrocellulose with which they come into immediate contact, and thus induce further decomposition. It is the purpose of the stabilizer to fix the nitrogen dioxide fumes to itself (by chemically combining with them) as soon as they are given off, thus preventing them from injuriously affecting the nitrocellulose of the powder. It will be readily seen that, in order to accomplish this result, the stabilizer must be thoroughly incorporated with the nitrocellulose, since, in order to minimize the catalytic effect of the fumes, their travel must be reduced to a minimum.

Each phenyl group (C_6H_5) of the diphenylamine molecule is capable of combining with three nitro groups (NO_2). This is in accordance with the usual chemical combinations taking place between the benzene ring (C_6H_6) and the nitro group, and may be well illustrated by the example of the formation of picric acid, one of the best-known high explosives, through the replacement of three of the hydrogen atoms of phenol by nitro groups, as shown below:



Phenol.
(Carbolic acid.)

exchanges the hydrogen in the 2, 4, and 6 positions for nitro groups, and becomes

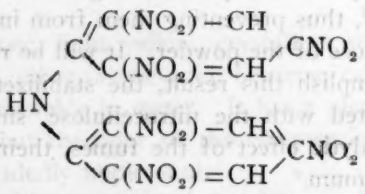


Tri-nitro-phenol.
(Picric acid.)

If we substitute in the phenyl group in the same way, we may get any one of the mono-, di-, or tri-nitro-phenyl groups, the exact product depending on the number and positions of the nitro groups inserted.

Theoretically, each molecule of diphenylamine is capable of combining with nitro groups until it has become a hexa-nitro

body. Up to the present time, a higher nitration of diphenylamine than the hexa-nitro-diphenylamine has not been accomplished. Since the NO_2 group may attach itself in place of any hydrogen atom present in either ring (so long as not more than three nitro groups enter one phenyl group), it is readily seen that the number of possible isomeric hexa-nitro-diphenylamines is very great. The graphic formula for one of these bodies is given below, this being used simply as an illustration to show the composition of such a body:



Hexa-nitro-diphenylamine. ($NH[C_6H_2(NO_2)_3]_2$.)

It is also possible for the NO group to be substituted for the hydrogen which is directly attached to the nitrogen of the diphenylamine, thus giving a nitroso body which has a composition ON—N<. In such a case the number of NO_2 groups attached to the rings would not exceed five.

In order that it may be thoroughly incorporated with the nitrocellulose, the diphenylamine is added with the ether; that is, it is first dissolved in the ether, and the ether is then added to the nitrocellulose as a solvent. When the ether is afterwards removed from the powder by volatilization, the diphenylamine remains in the mass of nitrocellulose.

When the decomposition of powder commences (without doubt during the process of manufacture), such NO_2 groups as may be given off are quickly seized by the diphenylamine and, being held securely, are prevented from doing further damage. Theoretically, the process should go on until every molecule of diphenylamine has been converted into hexa-nitro-diphenylamine; then it should cease, on account of the exhaustion of the diphenylamine present.

When all the stabilizer has been converted into the hexanitro body, the powder should be in very nearly the same condition (so far as the presence of free NO_2 groups is concerned) as it would have been in just after manufacture if no diphenylamine had been added.

That the theoretical action of the stabilizer, as set forth above, is not fully conformed with in practice, is well established. The analyses of powders that have reached the stage of decomposition necessary to give off nitrous fumes in the surveillance test at 65.5° C. have shown that the diphenylamine is then present chiefly as tetra-nitro- and as hexa-nitro-diphenylamine. This would indicate that it is not possible to get the complete theoretical exhaustion of the diphenylamine.

As stated by Lieutenant Commander Earle, in the article previously mentioned, powder in which diphenylamine was incorporated at the government factory has been in service since June, 1909. Since that time it has been stored under very unfavorable climatic conditions (in the Philippine Islands) and has not shown the slightest signs of decomposition. From all the evidence available it would seem that the use of diphenylamine in nitrocellulose powder has at least doubled the life of the powder, and that it should remain in a condition suitable for service for from 15 to 20 years, or even more.

Since diphenylamine is neither an explosive nor an oxidizing substance, it might be believed that its presence would exert a very undesirable effect upon the ballistic qualities of the powder in which it is used. This would probably be true if the quantity used were very great; but, since the amount now used is somewhat less than 1 per cent, the actual effects that have been noted are not of any great importance.

Care should be taken not to confuse diphenyl ($C_6H_5 \cdot C_6H_5$) or diphenylene (the bivalent radical $C_6H_4 \cdot C_6H_4$) with diphenylamine, $(C_6H_5)_2NH$, the stabilizer.

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A NEW SYSTEM OF SOUND SIGNALS IN FOG

By LIEUTENANT E. J. MARQUART, U. S. Navy

It is generally conceded that nearly all collisions at sea would not have occurred had both vessels proceeded on their original courses without changing speed. In other words the trouble results from trying to avoid each other, when neither knows what the other is doing. Have you ever tried to avoid a stone in your bicycle path, something you can see and which does not move?

This is borne out by the fact that many skippers, particularly of tramps, will go so far as to violate international rules of the road by keeping the fog-whistle silent, trusting that all others will obey and that their signals can be heard. When these are heard, the silent ship can better avoid all by her own maneuvers alone.

This is further borne out by the testimony in most collision cases that the fog-whistles were heard long before collision occurred, that numerous changes in course and speed took place from the first hearing of the fog-whistle—ever elucidating the fact that, when actually sighted, it is usually too late for ships to avoid each other.

It is these endeavors to avoid each other that bring about the situation at close quarters which requires certain maneuvers, and handling of ships, that are most difficult. It is not maintained that the proper things are done in these critical times to avoid collision, ever remembering that hindsight gives a different view from foresight—someone errs, whether it be because of limitation of human ability or not. It is insisted, however, that this crisis is brought about mainly because of endeavors to avoid each other from the earliest stages of the meeting.

Up to the time of actual sighting of each other, when it is usually too late to avoid collision, all the work of avoiding is in the dark, so to speak. Each has no idea of what the other is doing,

and the pilot's confusion grows as his estimate of the situation does not materialize in convincing signs. The efforts to avoid, defeat their own purpose.

When first in sound of each other, ships may change course to any point of the compass, chasing round to get a deceptive fog-whistle sound in a fog exactly located. It is apparent that the governing conditions of the problem of this first contact by fog-signals may be entirely changed before the ships get within actual sight of each other, when (and when only) it can be determined what each is doing. It is apparent that such conditions may be so changed as to be a new problem entirely, requiring different action at close quarters, on the part of both, from what each had reckoned. Both are practically guessing up to the last moment.

Recent collisions, with their great toll in lives, and nearly all collisions, have been due to ignorance or misunderstanding on the part of one vessel of what the other was doing, until too late. Whether or not culpability exists in such cases, a simple system of signals to avoid this misunderstanding entirely, by giving certain information at the earliest possible time, is essential.

In a crowded harbor like that of New York, how much depends upon the general knowledge of what the other fellow is doing. To be sure, more or less regular lanes of traffic exist, but safety lies largely in identifying the sound or tone of the fog-whistle with the knowledge of experience that the other ship is doing certain things. Identifying a fog-whistle as an ocean liner's and knowing about channels, etc., makes the pilot understand what the liner is going to do. The fog to him is not danger so much as inconvenience in that respect.

All this emphasizes how much we have used and do use sound as a means of indicating valuable information; and the use of this identifying quality of fog-whistles, in a systematized way, to indicate similarly, for all strangers, what each is doing and is going to do in meeting, naturally suggests itself.

This proposed new system gives to each ship information of the course of the other, within small limits, by the *tone* of fog-whistles when first heard; that knowledge gives worlds of information, which can be so easily obtained by using differently toned whistles for designated sectors of the compass, or, better still, different styles of whistles, like the siren, plain whistle and Claxton horn effects, if efficient ones can be found.

Knowledge of the speed would help, but an analysis of the rules of the road, and a second thought, show that knowledge of the course is more important by far. By fitting these whistles with a tremolo attachment, a vessel of higher or lower speed can be indicated. To change the rules of the road is not intended; these are to be strictly adhered to. Governed by them, speed matters not, as far as what *is* to be done, except when collision is imminent. Neither is this new system expected to save the day if the situation becomes so close-aboard acute that a touch of the helm either way is to mean salvation. The new system does its work on first hearing fog-signals, and thereby these close-quarter conditions are avoided. This new system aims to give early information of movements; that is, the course steered. Noting one after another of the courses indicated on the fog-whistles, the direction of turning of the ship to be avoided is determined. A modification, as noted, can be added to distinguish high-speed vessels from slower ones.

To know what each ship intends to do is precluded, though with this information of each other's movements, given by the new system, the rules of the road will establish what each is going to do from the first to the last stage of the meeting.

The installation is simple and can be applied to all vessels at very small cost. Cost of operation is not increased, no more steam being used. Four steam-whistles are to be installed in place of the usual one, each made with slight tuning-adjustment as necessary, to compensate for different steam-pressures, quality of steam, etc., and any other inherent characteristic elements affecting the tone of the sound; and with a tremolo attachment, or some other such characteristic quality, to be fitted, if desirable, to all the whistles of faster (or slower, as desired) speed than, say, 15 knots.

The general outline of the system proposed is as follows:

(1) Each steam vessel to be fitted with a set of four different whistles, each one of the set to be of a distinctive tone, each distinctive tone to be prescribed for use in a designated quadrant of the compass. All vessels will then use the whistles of the same tone for the same courses. The tones of the whistles adopted, are, of course, to be sufficiently distinctive to insure that one a little out of tune will not be mistaken for another.

(2) All whistles to be operated independently of each other; all

to be prescribed by law, examined, set and inspected by government inspectors.

(3) Small whistles or tuning-forks of the same tones to be carried on deck for the officer of the watch to identify the tone of fog-whistles heard, if needed.

Assume the four tones adopted to be called: North tone, N; East tone, E; South tone, S; West tone, W; North (N) to be the highest, then E, S and W, in the order given. Then:

(4) N to be the tone sounded by vessels on a course between NW and NE, including those points.

(5) S likewise to be sounded between SW and SE, including those points.

(6) E likewise to be sounded on easterly courses between NE and SE, excluding those points.

(7) W likewise for westerly courses.

(8) A magnetic course to be considered, since the ordinary ship's deviation can be ignored in this signalling, and the steering-compass course will undoubtedly be sufficiently close.

(9) Inter-cardinal points to belong to that quadrant indicated by their first part; *i. e., South*east goes with the *South* quadrant. moreover, any quadrant arrangement such as North to East can be assigned for a whistle, if the course is to be indicated somewhere within that quadrant.

It is evident that, with vessels in fog sounding the whistle assigned to that quadrant of the compass in which their course lies, the other vessel hearing knows that course within eight points. A study, later, of certain situations of meeting will show that this indication of courses within eight points may be sufficient.

If found to be desirable, the courses can be indicated to points in the following manner:

Vessels to sound the blast of the tone of that quadrant in which she is heading, followed by toots on the whistle of that tone toward whose quadrant the points of the compass are to be counted, one toot for each point. If on an exact point, that point to be counted as belonging to the preceding point.

For example, if heading on North, the North blast alone would be sounded. That indicates North course. If within the first point to the eastward of North (up to and including N by E), the prolonged blast as required by the rules of the road would be the blast on the North whistle followed by one toot on the East whistle.

Further examples (capitals to indicate blast, and small letters to indicate toots) are:

NNW	would be Nww.
NWxN	would be Nwww.
NNW½W	would be Nwww.
NW	would be Nwwww.
NW½W	would be Wnnnn.
WNW	would be Wnn.
West	would be W.
SWxS½W	would be Wsss.
SxE	would be Se.

Thus the prolonged blast of the rules of the road would mean: The blast alone, or a blast and toots up to four. This is the only change in the rules of the road.

It is evident that:

(a) The tone of the blast whistle indicates course within eight points maximum error.

(b) The tone of the blast whistle and the *tone* of the toots, both identified, indicate course within four points maximum error.

(c) If the number of toots is also identified, the course is indicated within one point maximum error. And each toot missed means only one point more possible error.

(d) It is highly improbable that, after repeated signals, any error of more than a point or two can exist.

(10) A vessel stopped shall immediately repeat her signal as above, to indicate her heading, instead of the two blasts required at present. Or it would be sufficient, with the information gained of her previous signalling, for her to sound only her blast whistle of that quadrant twice, since this blast whistle is to be used for all maneuvering signals as now required by law. Naturally it is to be prescribed by law which is to be adopted.

(11) In maneuvering, which will probably be in comparatively close quarters, the blast whistle only is to be used, this blast whistle being changed as the ship gets headed in a new quadrant. In this way it is an instant check on courses on intercardinal points; and it automatically indicates what rudder is being used in turning, and, to a lesser degree, how fast the turn is being made.

(12) A vessel backing must insure that she uses more than four toots in giving the signal "Engines reversed," though at this stage of the proceedings probably no misinterpretation can be placed on the toots, no matter what whistle is used. This signal should be given on the blast whistle.

(13) A vessel towing shall sound the blast and toots as required for others, followed by two toots of the blast whistle to indicate tow. If sufficient, only the blast whistle and two toots of it could be prescribed.

(14) Sailing vessels to be as now, or to be required to have the four prescribed tones on their fog-horns, and to use the proper one for each quadrant.

(15) Vessels going in or out of, or across, harbors with more or less regular channels and routes, are to use only the blast tones, the harbor being assigned general directions. For instance, if going in is assigned the N tone, then going out would be indicated by S tone.

(16) All vessels may use only the blast tone until the fog-whistle of some other vessel is heard, if desirable, whereupon the toots are also to be sounded.

It is to be noted that only two whistles will be used at a time, one for blasts and one for toots. The other two operating-levers can be turned back out of the way. A special grip or other marking device can be attached easily to one or the other of the two in use, to indicate which is blast whistle and which toot whistle. Whistle handles can be close to compass, and the compass card can be colored or marked in quadrants as outlined, for convenience.

A second thought on what it will mean for one to know what course the other ship in a fog is steering shows how amazingly simplified the problem will be, how intelligently one can then "navigate with caution until danger of collision is over."

One will know whether to continue stopped, whether go slow, which way to turn, how much to turn, how to take a safety course by paralleling the course or making one opposite, or a little more to clear well, or how to assume a safety position ready for the next development in case of any doubt.

The benefits are so great, and such little information obtained in time helps so much, that the troubles of hearing and locating sounds in a fog cannot possibly outweigh the benefits of such a system, even if not all the information intended is conveyed by the proposed system of signalling.

An objection offered is that perhaps the different tones of the whistles cannot be distinguished, that the ordinary man is not musical enough.

The small tuning whistles or forks are at his disposal; more-

over he need not worry whether the tones are properly pitched, need only distinguish what step in the scale of four they are. And as one now can distinguish ships by the tone of their whistles, after short experience, so can one easily learn the four designated by law, to be the same for all vessels. The tones are to be distinctive enough to prevent their being vitally affected by any vagaries in transmission in fog.

In the event that his bridge tuning-whistles or tuning-forks do not serve their purpose for him, owing to his personal limitations, the officer of the watch can judge by the tone of his own whistles. Unless he is on course N, E, S or W, he will be blowing two different-toned whistles, and these would serve to distinguish the steps in the scale of the fog-whistles he has heard. If he were on a course N, E, S or W, he could change part of a point, if necessary, in order to sound a second-toned whistle which would give him his own two tones to compare with those heard.

If he could locate with reference to his own only one tone of that other fog-signal, either the blast or the toots, he would know much. If either of such tones is the same as his own, he knows that the other is heading somewhere within the same half circle on sixteen points as himself. If neither tone is the same as his, the heading is in the opposite half circle of the compass.

Under any circumstances he is to carry out the present rules of the road—the different tones are only to help, to furnish information. And most assuredly any man capable of being officer of the watch could get something. If he misunderstood, absolutely misunderstood every signal, he is still to be bound by the rules of the road, and to navigate accordingly. This new system can work no harm even to an incompetent; it will work good to nearly all. It replaces the present guess with a little information, which is badly needed.

Another objection suggested is the possibility of confusion in using the whistles. There would be no excuse for this except in close quarters and rapid changing of course. But it is to be borne in mind that this signalling is primarily for use when the fog-whistles are first heard, to prevent these close-quarter surprises, when any and all tooting of whistles seems to result in nothing more than arguments in collision suits at law.

In such a case of promiscuous use of the whistles, the very fact of such use itself would indicate the nature of your acquaintance

—you would know he was more to be looked out for in his excitement and confusion. And his previous signalling may have told you what he was doing before he became too excited to know what he himself was doing. Besides, with all whistles going indiscriminately, is one any worse off than at present? It is still a whistle in the fog, and just as much to be heeded. For the rules of the road are to be faithfully followed even from the first sound heard.

The radio's efforts to be of use in a fog will help, but reliable and instant direction- and distance-detectors are very likely to be far in the future. They may be signals of a weak set near by, or of a strong set far away; there may be two or more at once to confuse. The fog-sound signals indicate at once, by their *tone*, a great deal of information about as many ships as one might meet, without any confusion as to where they are. Further, radio service requires apparatus, and though most ships of all kinds are now equipping, they would require the services of operators.

Submarine signals have only one tone, but they could also carry four-toned bells or sound vibrators, using perhaps a double stroke as a long blast in the use of the bell. But not all ships carry them, and they depend on delicate telephone apparatus, and their direction can be detected only by pointing the ship. Any apparatus to obviate this latter handicap would be highly complex.

Both radio and submarine signals could be used as a check on the sound signals.

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THE PREVENTION OF GRAFT IN OFFICERS' MESSES

By P. A. Paymaster Graham M. Adee, U. S. Navy

With an experience of approximately four years as treasurer of wardroom messes aboard several ships, the writer has gained some insight into the financial working of officers' messes; and it is with an idea of distributing the information thus gained, thereby "saving the pockets" of officers in the service, that this article is written.

It has been found that the steward of the mess desires to do as much of the purchasing himself as possible. He desires best of all to run a "steward's book." In this book he makes note of the items he says he purchases for the use of the mess and the prices he says he pays. This method, on its face, invites a middleman's profit, as purchases may be made from some small dealer at a small price and charges made at a high price to the mess. It has been found that the notation as to quantities is not always accurate. It has also been found that the stewards with whom the writer has been associated have, with one or two exceptions, made efforts to gain information as to just how much the mess shares were worth, how much money there was on hand, and other facts that would show them just how much the mess possessed in the way of assets, so that they might gauge the prices for the "steward's book" accordingly.

The following suggestions are made with a view to reduce mess bills paid by officers:

(1) Buy as much as possible from the commissary officer on the ship. The prices are low, as the articles are bought in large quantities under advantageous conditions. Copy of receipt is given, and the bill is submitted by the commissary officer monthly.

(2) If purchases cannot be made from the commissary officer,

have the steward fill out the following sample form—an original and a carbon copy:

U. S. S. "VERMONT,"
Wardroom Mess,
Vera Cruz, Mexico,
June 19, 1914.

Messrs. Richard Roe & Co., Vera Cruz, Mexico.

Please deliver on board this vessel on dates noted below, the following provisions:

Date of Delivery	Quantity	Unit	Article
June 20, 1914.	12	doz.	Bananas.
June 20, 1914.	5	doz.	Oranges.

.....

P. A. Paymaster, U. S. Navy,
Treasurer Wardroom Mess.

These forms are to be signed by the treasurer of the mess—the carbon copy to be retained by the mess treasurer, and the original to be delivered to the store where the mess is to deal. Deal with standard merchants. Perhaps all articles may be ordered from one store, or maybe there are to be several stores. At the Boston Navy Yard it was found more advantageous to deal with the following number of firms: one for meats, vegetables and general groceries, one for milk and cream, one for fish and one for fruit. No mention here is made for laundry service and newspaper service. These are small items in the monthly expenditures, and need no systematic management of purchase to prevent loss. All bills are to be made out to the mess, and it is deemed a good suggestion to have the statement appear on the bill that it includes all charges to date. It is well to make payment by check in all cases where it is practicable.

(3) Reduce to a minimum purchases in which the steward is unable to obtain receipts. In this case the "steward's book" will have to be relied upon.

As an illustration of the saving per month to each officer by employing this method, the writer saw mess bills on the U. S. S. *North Carolina* reduced from $25 a month to between $15 and $20. This in the course of a year amounted to a saving of approximately $100 for each officer. The answer was evident: the "steward's book" had disappeared. It is needless to say that the steward, old in the service, who had used the "book" was disgruntled, and he wound up with a court-martial. The efforts of

the present steward on that ship are most commendable, and his assistance along the line of the suggestions herein contained aided materially in placing matters on a good business system. His predecessor practised all of a faithless steward's tricks: he tried by all kinds of subterfuge to influence the treasurer against the merchants being regularly dealt with. In one case he substituted rotten fruit for good, and he always maintained that the deliveries were of inferior quality and made at inconvenient hours. But such was not the case. After this inefficient steward was gotten rid of, it was discovered that he owned valuable real estate in Boston—on a wardroom steward's pay of about $55 a month.

In a poor market, like Vera Cruz, it is impracticable to carry out, in all the details, the suggestions just made in (1) and (2); but the chance of a financial leak will be minimized if the steward submits a list each time he is about to make purchases of the articles required, and if, after purchase, the prices he states that he paid are checked, at least in a general way, by personal or other reliable inquiry. On the ship the writer is attached to at present, the U. S. S. *Vermont,* even in the poor market of Vera Cruz—with eggs at 64 cents a dozen, U. S. currency, and other items relatively high—mess bills have been reduced from $30 a month (which was the mess bill in the excellent market of Norfolk) to $25 here, with just as good a standard of menu; and the value of the mess shares has increased.

From careful observation, it is thought that officers' messes are regarded by many stewards as a field in which the salary is not to be considered the entire remuneration. General inquiry into the manner in which officers messes are run, both as to purchases and as to waste, lead to the assertion that a hotel or private establishment conducted on the same basis would go into bankruptcy in short order.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

SHIPS' LIBRARIES

By Lieut. Commander Thos. D. Parker, U. S. Navy.

Really efficient people, it is said, always find time to do things. It is therefore assumed that the busiest executive or battery officer can snatch from the jaws of routine a few hours for mental recreation, general culture, and professional broadening. So that, in looking for ways to make shipboard libraries serve their purpose, we may quash the indictment, "I have no time to read."

The fact is, however, that with present conditions, neither officers nor men make free use of the libraries. On one ship, for instance, I suggested that bookcases be placed in the wardroom, instead of in a locked storeroom as at present. "We used to have them there," was the smiling answer, "but no one ever read the books, so we moved them down below."

This may be an extreme case, but there are others. The writer himself, though fond of reading, has done comparatively little aft, and would have done still less if forward. There seem to be two main reasons for this: the books wanted are usually not on board, and those on board are usually not accessible.

Though the object of this article is constructive and sincerely non-critical, it is necessary to make the statement of difficulties a little more specific. For instance: On a certain modern battleship an officer wished to use the library. He found: (1) that the books were those he had learned to love in the days of two-steps on five-caliber warships; (2) that the printed list was hopelessly incorrect; (3) that the books were locked up in various burglar-proof cases, including some in the cabin; (4) that the yeoman was as hard to find as the books. This might be any ship, any year; the case is typical. Doubtless the volumes are carefully inventoried and accounted for to the Navy Department.

I think most "sea-going officers" will call this a fair statement, covering many cases. Having been "library officer" myself, I

understand the causes—the yeoman has many other duties; it is hard to keep the multiple lists corrected; the losses are rigidly investigated, and so on: yet I think it can be shown not only that libraries thus miss their purpose, but also that, without great throes, they can be made to serve it.

From Outside the Ship.—The first desideratum is a correct selection of books: rigorously correct because the number is necessarily small. Negatively, no doubtful utilities should be included, no haphazard selections permitted. Positively, the best advice should be secured as to which of the countless *ne plus ultra* books are most suitable for the navy. Considering the big educational values involved, it would seem worth while to detail an "officer of experience" for the duty (the sole duty) of choosing books for shipboard libraries. He should be advised or directed by a board of experts, in order to avoid the one-man bias in a matter of such importance. Practically, he might be the secretary, or the working member of a duly constituted board. His broad duties would be the making up of lists for the ships of each class; the collection of data as to the books needed or called for; a study of the correct proportions (histories, handbooks, novels, etc.) for a ship's library; investigation of the relative merits of technical books; a wise selection of standard fiction; a discriminating choice of "strictly fresh" literature; arrangement for the prompt issue of timely books—just now, for example, any bearing on the European War.

The rest of this officer's time (to borrow from Mr. Richard Harding Davis) "he might have to himself."

All the above duties are fulfilled for a village library. Are they dispensable for that big community, the United States Navy?

Should not the final selection of books be methodical, scientific, the best work of an officer who focuses on this, who knows the service, knows the service needs, and can name the books to meet them? Would it not promote efficiency if the same mail that brought a Proclamation of Neutrality also brought the half-dozen books that everybody on board is asking for. Every bookseller's window showed "Viva Mexico!" and similar works a month ago: could not ships' libraries meet the same emergency demand?

Is it not evident that these libraries should include the War College list of specially recommended reading? Would not this

be arranged for by an officer whose other duties did not crowd out such details?

Since the selection—excluding "indigestibles"—should meet the demand (except when creating one), a systematic effort should be made to find out what literature the service wants. Obviously a library will not function otherwise. If officers were given printed forms and invited to fill in the names of books desired (if care were taken to collect and forward these suggestions quarterly) the "Director of Libraries" would have valuable data for future lists. In several cases the writer has found the Department willing to meet requests for special books—sometimes not.

A circular letter regarding libraries, dated June 21, 1912, announced the bureau's intention of adopting a standard ships' library.

Before passing aboard ship, it may be proper to note a serious gap in our library system—the lack of facilities for officers ashore. When opportunities for reading are, on the whole, a maximum, the books are far away. The special technical collections of the yard departments do not meet the case, nor do city libraries, old literary junk, or subscription reading rooms. It would be a great blessing if each yard had a good "ship's library."

Now as to shipboard conditions, taking first the books: an excellent order of yesteryear provided for the renewal annually of a third of those in each library. In the crew's library this renewal is very necessary to eliminate insanitary and worn volumes; and in both libraries it should eliminate obsolete and undesirable books. Perhaps the opportunity for betterment is not fully grasped. The writer has recollections of ancient volumes and of ancient vintages of Jane or Brassey since the order was promulgated. All worn and useless books should be weeded out. In making requisition for replacements it seems desirable to include the following: (a) special volumes requested for special reasons (see above)—*e. g.*, Steele's "American Campaigns," of interest in connection with fighting in Mexico; (b) all acceptable recent publications on the bureau's list; (c) the War College selection referred to above—books like the masterpiece of Chausewitz, "On War"; (d) books of great professional interest that one is otherwise forced to buy, like Graham-White and Harper's "The Aeroplane in War"; (e) reference books (duplicate or triplicate sets) for use in various parts of the ship—

the supply of these being usually inadequate; (f) carefully selected fiction, with more for the wardroom; (g) more simple, practical, technical books for the crew.[1]

The ships' libraries usually contain little or no fiction. Since light (not trashy) reading is one of the best means of relaxation, and some fiction (say Tolstoi's "War and Peace") is highly educational, it is hard to see why officers should be barred from "Class 20." For several reasons it is not satisfactory to depend on the crew's library; and officers who have failed to order the "best sellers" from Brentano usually fall back on newspapers, old magazines, or "the movies."

The assortment of handy books and other technical works for the men is not complete. Some excellent volumes are there, but many that men would use are lacking, and might well take the place of deadwood. A wider selection would further the school work instituted by the present Secretary of the Navy, and increase the efficiency of artificers in their duties on board.

We come finally to the vital matter of facilities on shipboard. A few simple changes will double the usefulness of the average library.

[1] The circular letter of June 21, 1912 (previously referred to), states:

"1. It is the desire of the bureau to adopt, as soon as practicable, a standard ships' library, and, with this end in view, it is desired that, after July 1, requisitions for books for ships' libraries be not itemized and that requisitions be submitted for a given number of books for the ship's library to take the place of books lost or damaged.

"2. As soon as it is possible to adopt the standard library, all libraries will be furnished with a copy of each book as it is adopted. When a book is lost or damaged, requisition will be submitted for another book of the same title.

"3. The bureau will furnish, semi-annually, all vessels with the list of all books eliminated from the ships' standard library, and all such books on board ship will be surveyed and forwarded to the navy yard, New York, to be disposed of.

"4. One-third of a crew's library will be surveyed each year, as in the past, and requisitions submitted for the renewal of these books will be simply for a certain number of books, which will not be itemized. The number of books required for will be forwarded from the New York yard.

"PHILIP ANDREWS."

The writer does not know to what extent the above plan has become effective; but believes that the suggestions made above are not inconsistent with the bureau's general policy. As to some of these, more is said below.

The following suggestions are based on efforts and observations in service. I have aided in carrying some into effect, and am sure that all are practical. They partly answer the question: "What to do to make reading handy for the enthusiastic ensign, for "pay" who has "just been caught"—or for the new ordinary seaman dazed and drifting about the decks"?

As said before, most of the books are now concealed in locked cabinets, where they can only be reached through an elusive navigator's yeoman. Circulation is very weak.

Three improvements are generally necessary: (1) put books where they will be seen; (2) find the yeoman; (3) supply convenient corrected lists.

On ships the libraries are in out of the way, badly lighted corners, in cases through which the titles could be read only with the X-ray. The first step (in these instances) is to move the ship's library to the officers, the crew's library to the crew. Though it is quite proper to put certain reference books in the cabin, these should be duplicated elsewhere. Other books should be kept in spaces more convenient to those retiring souls who hesitate to intrude on the captain's privacy. If these books are in the wardroom they should be in plain view; and—D——n the torpedoes!— *the cases should be kept unlocked.* It chills the reading mood to round up that man with the keys. Of course, mess attendants should be prohibited from taking books to the pantry, and officers directed to fill out a card and drop it in a box, as is done at the War College.

Some volumes should be kept in the steerage, others in the warrant officers' quarters. If the cases are all in the wardroom, half the officers will never see the books. Theoretically they can consult the list and the yeoman—but it is so much easier to light a cigarette!

The only successful ship's library I have known was the gift collection on the shelves around the wardroom of the U. S. S. *Princeton.* The books—a charming assortment—had been chosen by Princeton men; they were in plain view and easy reach. I venture the assertion that each officer on this gunboat read three volumes while his battleship friends, using safety collections, were perusing one. In the first case, Ensign A——, having a spare half hour, spies an attractive looking book with a good title, pulls it from the shelf, starts and decides to finish it. In the

other, Lieutenant B——, having a spare hour, rings for a boy, gets him after heartbreaking delays; eventually reaches the yeoman, who will come when he can get away from the navigator; asks for a list, eventually gets it, asks for a book—finds that it is out, or is being surveyed, or is being re-bound, or has never been heard of. B—— goes on watch and relegates the ship's library to a place called Limbo.

Though it would be unwise to unlock the crew's shelves they should at least be in a prominent, well-lighted place, where the lure of the cover would be felt and titles easily read. Wooden doors are fatal and glass ones should *not* be screened.

Suppose Seaman Doe fastens his eye on a book with a red binding and resolves to read it—how shall he get the book? Probably a notice on some bulletin board in a corner states that twelve hours later a yeoman will deliver books to all comers. By that time John is out in a boat or has forgotten the impulse—perhaps the yeoman has forgotten, or is striving to get a log signed. The chances are that John Doe and the book will not come together.

Now, if every battleship had a yeoman-librarian whose paramount duty was to sit near the shelves several hours a day, John Doe would draw, and draw again.

Or failing this, if there were convenient *corrected* lists for officers and men, the outlook would be much better. Two improvements are necessary here: First, keep in the office a card catalogue (showing shelf and number as well as name) absolutely correct to date; second, call in all printed lists annually, after the survey, and correct them for re-distribution when the new books are received.

In closing, a few special devices, in line with those customary ashore may be suggested:

(1) Keep collections of a special nature on special, accessible shelves. On the U. S. S. *Delaware* the War College selection was in a little unit to itself.

(2) Handle newly received books in a similar way.

(3) Arrange books in the shelves by numbers and classes, and if cases are unlocked have a small cabinet at hand with cards to show the location of books.

(4) Have special library bulletin boards forward and aft, and post on these a list of newly received books, volumes withdrawn

for survey, works suggested on special topics, etc., for the convenience and encouragement of readers.

On the *Delaware* a large and well-lighted, well-ventilated space, with tables, benches and racks, is set apart for a crew's reading and reception room. It is very popular. Ship's trophies are kept in this room, tables and racks are well supplied with papers and magazines paid for from the welfare fund; a man can entertain his friends there. If the new battleships were designed with a space of this sort, *having additional space for library cases,* and a desk for a librarian in attendance during reading hours, the crew's library problem would be solved. The *New York* (it is said) has such a space, with the shelves near-by; but it is much too small. On the *Delaware* some cases could be placed in this compartment, and the others are already near the door. If the space on late ships were sufficiently large, a few desks or tables for writing might also be installed.

Since the ship is a *home* for the crew as well as for the officers, is it too much to ask that a space as big as a wardroom should, on a dreadnought, be set aside for the comfort, recreation and education of a thousand men? From the standpoint of *naval efficiency* (and no other) would not this pay? Room for the battery first—but in these days of patient I. C. S. climbers, radio wizards, and candidates for advancement or for our technical schools, we can no longer expect Jack to do all his ciphering on a ditty box or a lump of coal.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE SUBMARINE AND THE FUTURE

By ENSIGN V. N. BIEG

The great European conflict now raging has even in its present short duration demonstrated incontestably the value of the submarine as a defensive and offensive weapon of war.

Admiral Sir Percy Scott has gone so far as to declare that the submarine has sounded the death knell of the battleship, and that it soon must be relegated to the realms of the obsolete.

With the Panama Canal to defend and in view of the defensive nature of the military policy of the United States, there can be no doubt that a powerful fleet of submarines would be an incalculable asset and well worth the amount of money and labor necessary for its construction and maintenance.

If, as would seem possible, the submarine's speed, its carrying capacity and steaming radius can be increased and its sea keeping qualities developed, the safe navigation of hostile battleships will, to a certain extent, become impossible. Then, for isolated countries at least, like our own, which has no merchant marine and is not dependent upon one, the Lotus dreams of the peace advocates are indeed near at hand.

By a not too stringent demand upon the imagination, one can conceive the following conditions existing during a supposed conflict. The older types of submarines now built are in use for harbor and local coast defenders, guarding well our two extended coasts with sufficient numbers secured at far from a prohibitive price. Our best and newest types in fleets are operating from bases on both coasts. These new fleets are swift, with a cruising radius of from 5000 to 6000 miles, sea keeping qualities equal almost to those of the present battleship and with equal or greater speed. These two fleets form an advance defence and employ what might be termed aggressive-defensive tactics.

Suppose a large advance base outfit leaves the English Channel, say for the West Indies. There are battleships or battle-cruisers, transports, colliers, etc. Given speed and steaming radius sufficient, could not our fleet of submarines, probably costing less than two or three units of the enemy protecting convoy, totally demoralize and destroy such a force before they were well on their way? Could not such an efficient body of underwater craft make absolutely impossible the operation at any great distance from its home port of a great fleet with its necessary cumbersome train of colliers, repair and store ships, transports, etc., or of any fleet of sufficient strength to establish and maintain a naval base?

The answer is manifestly yes with a big Y.

Then let us hail not the dove as the assurer of our future peace, but the submarine, and with all due respect to the bird take off our hat to that craft.

However, there exists at present no such perfect type of boat as this composing our supposed aggressive fleets, and the difficulties to be overcome in order to achieve such perfection are well nigh insurmountable so long as the submarine retains its present form, for with a specially constructed hull, fitted with diving rudders, etc., with lines which are at best a compromise between those best suited for surface running and those for submerged work, it is inconceivable that a submarine will ever be built with more speed than can be attained by purely surface war craft designed solely for that purpose.

Therefore, to gain relatively cheap military security from oversea attacks, as we must have an offensive fleet as well as a defensive one with which to prevent the establishment of advance bases near our soil, the present type of submarine must change or rather give way to a new development which is capable of competing on equal terms with the battleship or its modifications.

The writer's conception of such a craft is a heavily armored submersible, a description of the general features of which follows:

The armored submersible would be a ship whose hull was designed with greatest efficiency for surface running. No provision for diving would be made. Whether or not there would be bouyancy enough in the armored craft when running awash to obviate the necessity of depth controlling apparatus is a matter for experiment which could readily be carried out with a submarine

now built, and probably can be foretold now by our submarine officers. The protection afforded the present submarine by the water above her decks when she attacks with her periscope just protruding would be secured in the new type by her heavy armor, for diving apparatus being dispensed with the weight of storage batteries, motors and other underwater gear would be absent and that allowance put into armor. Pumps and a simple arrangement of tanks for submerging until just awash would be installed. Powerful ventilating sets would be provided. A small conning-tower affording access to the interior would be fitted, designed with an armored hatch inside at the deck level so that with this hatch closed the tower could be shot away without impairing the watertight integrity of the hull. A much more powerful wireless plant would be installed on this ship than is permissible with the present type of submarine. The likelihood of its being shot away would, of course, be great, but this would occur only after it had served its purpose of sending and receiving the information which brought the submersible to within range of the enemy. A number of renewable periscopes would be carried in store. A small independently operated generator would supply the necessary heat for cooking, etc.

Due to the fact that the hull would not be specially constructed to withstand the pressure encountered in deep water, it would be possible to build the ship any size, the only restrictions being the requirements for speed and the limit of power of oil engines. If steam were used, and with proper design this is possible, as has been proved in the *Katahdin,* this latter limit is not narrow.

No dependence within torpedo and gun range would be placed on invisibility, reliance being placed solely on invulnerability.

At a distance which would make a battleship or other purely surface craft clearly visible the sumbersible awash would be indistinguishable, so that an attack could be made by closing in at full speed and delivering torpedoes long before the ship attacked could get up full power of steam to retreat, unless she kept boilers enough lighted at all times to proceed at full power at a moment's notice, a procedure unprecedented.

At practical torpedo ranges the angle of fall for large guns would be so small that an underwater run of projectiles would be exceedingly rare, and it is believed that even the largest shells impinging upon an almost flat armored deck would be ineffective,

so that the nearer the submersible approached her enemy the more secure from attack she would become. Further, the submersible proceeding at, we will say, 20 knots, would be a very illusive target. In calm water, when gun-fire should be at its best, the chance for securing underwater hits with projectiles is least.

A study of the underwater trajectory of shells indicates that with side armor extending only 6 feet below the surface when the ship is submerged, the protection afforded would be ample against the lucky shot which did get home.

Damage from ramming, of which the present submarine must be fearful in the vicinity of destroyers, would be impossible. The submarine when rammed, if not sunk, will at least have her periscope torn off, in which case she is *hors de combat* until she rises to the surface, whereby she again exposes herself to a second ramming attack. Anyone who has seen the bows of a destroyer after having been brought to an abrupt stop by a dock can imagine the result of a collision between one of them and a heavily armored deck.

The old ram *Katahdin* is available for trials which would substantiate claims made for this type of craft at little cost, and the writer, on the strength of his convictions that the armored submersible can be successfully developed, humbly suggests that before great sums of money are expended on the present type of submarine, the type here described be given a conclusive test.

U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

EXTRACTS FROM MAHAN'S NAVAL STRATEGY (1911)

By LIEUTENANT W. T. LIGHTLE, U. S. Navy

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4. Introductory—
. . . . ancient strategic principle of the value of interior lines.
. . . . changes in weapons affect practice but not principles.
6. Napoleon says "Exclusiveness of purpose is the secret of great successes."
8. The principle . . . . is that of keeping a superior force at the decisive point.
15. Principles of general application whether the operations were conducted on land or at sea.
18. . . . . the appreciation of international conditions as an essential factor in all military plans.
20. Foreign policy and strategy are bound together by an indestructible link.
22. The stretch of the Danube from Ulm to Ratisbon was and . . . . always had been for 2000 years the controlling military feature of the country.
30. . . . . effecting local superiority by concentration, which is the fundamental object in all military combinations.
32. Briefly, interior lines are lines shorter in time than those the enemy can use.
33. At the present moment Germany and Austria as members of the Triple Alliance have the same advantage of central and concentrated position against the Triple Entente (Russia, France and Great Britain).
36. Napoleon's saying that "War is a business of positions."
37. This instance illustrates as Port Arthur conspicuously did, that the value of a position is not in the bare position but in the use you make of it.

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38. The most convenient commercial route is not necessarily the most significant to strategy.

43. Richelieu . . . . attempted too many things at once, instead of concentrating for decided superiority in one or two localities.

43. The proverbial weakness of alliances is due to inferior power of concentration.

43. In any military scheme that comes before you, let your first question to yourself be, Is this consistent with the requirements of concentration?

43. Our profession has never produced a man more daring in enterprise, nor more skilful in management than Nelson.

45. . . . . the existence and effect of a single principle, underlying and deciding in circumstances which superficially seem very diverse.

55. Taking present conditions in Europe and present Naval Programmes, the Two-Power Standard requires that Great Britain have in home waters a fleet distinctly superior to that of Germany, and that she shall be able coincidently to place in the Mediterranean one equally superior to those of Italy and Austria combined.

59. Not that central position, interior lines, or concentrated force, each singly or all united as Togo had them, confer security or certainty. The result from all is merely that they confer distinct advantage.

68. To control a commercial route necessitates two strategic factors: (1) a mobile navy, (2) local ports near the route upon which the navy can rest as bases of operations.

69. It is an interesting fact that we now see the British Navy concentrated up to 85 per cent of its battleship force, just where the English Navy had to cling in the early days of Cromwell, and for the same reason . . . . the rise of a new maritime power (Germany) near to the home shores.

73. The position of Great Britain relative to the commercial approaches to Holland . . . . gave her a strategic advantage over her enemy of that day precisely similar to that which by position she now enjoys over Germany.

73. The development of the German Navy is to be attributed, at least in part, to the recognition of this disadvantage of

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position. The concentration of the British battleship force in home waters is the reflection of the German development.

74 and 75. Illustration of exercising principle of concentration—Togo and Kamimura.

76. The inevitableness with which the appearance of a navy on a scene of operations distant from its home country, leads to the acquirement of permanent positions in such region.

95. Delay is the great gain of defence.

100. Concentration, the great factor in strategy.

115. We must get hold of the principles which, throughout all changes, underlie naval war.

123. Naval strategy has for its end to found, support and increase, *as well in peace as in war,* the sea power of a country.

132. The strategic value of any place depends upon three principal conditions: 1st, its *position;* 2d, its *military strength,* offensive and defensive; 3d, the *resources* of the place itself and of surrounding country.

143. The one most demoralizing attitude is that which demands exemption from risks, or is daunted unduly by them.

144. Coast fortresses are in greater danger of capture by land attacks than by those from the sea.

150. Panic, unreasonable apprehension, when war begins, will be found in the same persons who in peace resist reasonable preparation.

152. The distinctive feature of naval force is mobility, while that of a passive defence is immobility.

157. . . . . a strategic question of the greatest order, namely, the proper position for an outside fleet charged with the duty of checking the movements of a more or less equal enemy within a port.

158. The strategic reply to this question is as certain as historical experience can make it. The intercepting fleet must keep so near the harbor mouth that the enemy cannot get a start.

169. It may be laid down as an essential principle that on every sea frontier there should be at least two secure ports sufficiently fortified and capable of making any and all repairs.

171. While dissemination may be necessary to rapid preparation, concentration is essential to vigorous execution.

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173. The common result of a great victory is separation of the beaten vessels. The recurrence of such conditions of separation is a permanent feature of warfare of which strategy and tactics have to take account in all ages.

173 and 174. The problem of uniting a divided fleet . . . . may be expected to recur.

174. The very improbability of an effort has often been the cause of its success.

174. All history, including the war between Japan and Russia, affirms the ease with which small vessels can proceed along their own coasts.

176. The great importance of rapid mobilization.

176. The value of any position, sea or land, though very real, depends upon the use made of it.

177. Napoleon once said that the art of war consists in getting the most of the chances in your favor.

183. . . . . victory at the Nile, the most complete probably in the annals of naval war.

189. Large deductions . . . . must be made from the strength of a strategic position . . . . in consequence of its distance from the home country.

190. When the immediate object of the expedition has been accomplished, the assailant passes from the offensive to the defensive, with its perplexities.

190 and 191. All consideration goes to show that the supreme essential condition to the assertion and maintainance of national power in external maritime regions is the possession of a fleet superior to that of any probable enemy.

191. . . . . Principle of land warfare, that the armies in the field, not the garrisons, are the effective instruments of decisive war.

191. . . . . in naval war the fleet itself is the key position of the whole.

191. A fleet charged with the care of its base is a fleet by so far weakened for effective action—weakened both strategically and tactically.

194. Jamaica, which in my judgment has the most controlling situation in the Caribbean.

19. . . . . in places which justify fortification, both the works and the garrison must be adequate to all probable exigencies.

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195. First of all, what is the essential military requisite of a naval station? . . . . the highest function of a navy yard is to maintain the fleet in efficiency in war . . . . No utility in peace will compensate for the want of this in war.

198. The maintenance of any system of maritime fortified stations depends ultimately upon superiority upon the sea . . . . upon the navy.

199. . . . . in war the proper main objective of the navy is the enemy's navy.

200. Secure communications at sea mean naval preponderance.

202. . . . . when a government recognizes that the national interests in a particular region may become of such character as to demand military action, it should be made the business of some competent body of men to study the ground carefully, after collecting the necessary information, and to decide which points have strategic value and which among them are most advantageous for occupation.

205. . . . . determine the particular plan of operations best suited to obtain your purpose. This involves the choice of a base, of an objective, and of a line of operations—three things inherent in every operation of war.

212. . . . . "The art of war," he (Thiers) said, "consists in the skill to disperse in order to subsist, yet in such manner that you may quickly concentrate in order to fight."

212. Without ammunition a ship may run away, human life may be supported on half rations, but without coal a ship can neither fight nor run.

214. It must be remembered that the Monroe Doctrine is not a military force, but only a political pronouncement.

222. . . . . under all conditions of material or mechanical development, strategic problems remains the same, though affected by tactical difficulties peculiar to each age.

226. . . . . the tactical embarrassments inseparable from an expedition composed of ships of war and transports.

229. The transfer of the Syracusan fleet to Tarentum (about B. C. 413) . . . . illustrates aptly both the *power* and the *limitations* of a "fleet in being." The momentary safety of Syracuse would illustrate the *influence* of a "fleet in being"; its (Syracuse's) subjugation after the fall of Tarentum would show the limitations of such a fleet, which, by definition, is inferior.

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230. This episode in the Peloponnesian war . . . . gives us all the conditions of a distant maritime expedition in any age. . . . . home base, Athens . . . . advanced intermediate bases at Carcyra and other places . . . . , the objective, Syracuse, ... the neutral, doubtful or hostile country to be passed, along coast of Italy, ... enemy's advanced post at Tarentum, the smaller but still respectable fleet of Syracuse . . . . the difficulty of communications . . . . tactical embarrassment of a train of supply ships . . . . tactical difficulty of ships deeply laden for a long voyage . . . . the wisdom of meeting enemy half way and harassing his progress . . . . the danger of waiting him at home on the defensive . . . . the perception of a navy's true sphere—the offensive.

231. . . . . reasonable preponderance of chances that the landing (of Bonaparte's army in Egypt) could be effected before an interrupting force could come up.

231. Good communications with home was the one thing necessary to his final success; nay, to the very existence of the French army in Egypt.

232. Napoleon's saying: "War cannot be made without running risks" . . . .

233. . . . . The retention (of the French fleet) in Alexandria was open to two objections: first—tactical—that the fleet, though perfectly safe, could be easily blockaded there, and could with difficulty come out and form in the face of an active enemy. . . . . Second, the strategic inconvenience that its presence there would draw the British fleet to the precise point where transport ships and supplies from France must converge.

233. Tactically the fleet was devoted by its commander to a passive defence, giving up its power of motion, of maneuver, and of attack . . . .

Strategically, Bonaparte, in this case, was relying upon the deterrent effect of the "fleet in being" upon Turkey.

234. It is in a case of this kind that the helpfulness of principles clearly and strongly held is felt.

235. It is easier to get out of a blockaded port than into it.

235. . . . . the initiative is the privilege of the offence.

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236. . . . . Therefore the aim of the weaker party should be to keep the sea as much as possible; on no account to separate his battleships, but to hold them together, seeking by mobility, by frequent appearance; which unaided rumor always multiplies, to arouse the enemy's anxiety in many directions, so as to induce him to send off detachments.

238. . . . . There can be little doubt that Nelson's genius would have led him straight to the enemy's (French) fleet, the *true key* to such a strategic situation; but not every admiral is a Nelson, and even he could not have stopped the communications effectually before he had found and beaten the fleet.

240. . . . . none but a hopeless doctrinaire would deny that circumstances powerfully modify the application of the most solid general principles.

240. Napier estimates the presence of Napoleon on a battlefield as equal to 30,000 men; and it is no exaggeration to say that Nelson, for thorough dealing with the enemy's fleet, was equal to a reinforcement of three ships of the line.

243. What is the true strategic use to be made of the naval force when the key to a maritime region, or any advanced position of decisive importance in such a region, has been won by a combined (army and navy) expedition. The answer . . . . the particular expedition passes from the offensive to the defensive and . . . . the true part for navy . . . . is the offensive-defensive.

273. The guiding principle in all these cases is, (1) that your force must not be divided unless large enough to be nowhere inferior to the enemy, and (2) that your aim should be to reduce his base to a single point, out of which he can be driven by regular operations, or . . . . at least to reach which with supplies or for refuge, his fleet must accept battle.

276. The fleet, it cannot be too often repeated, is the chief element of strength in naval warfare; but the fleet, with strong points to support it, is stronger than the fleet alone.

284. . . . . The first object, in order of the defence, is to gain time.

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286. . . . . To the offensive belongs the privilege as well as the risks of the initiative; the distinguishing value of the initiative is that its purpose, known to itself, is one, is concentrated.

286. . . . . The defence, being ignorant of its opponent's purpose, to which it is compelled to conform its dispositions, feels endangered in more directions than one. Its tendency therefore is to dissemination, as that of the offence is towards concentration.

291. The aim now of the defendant's (weaker) fleet, is threefold: 1, the battleships should be kept together; 2, they should endeavor not to be shut up in either port; 3, and the battle fleet should not allow itself to be brought into action unless favored by circumstances.

291. . . . . In choosing its local base of action . . . . the defendant fleet should consider seriously . . . . which part is most likely to be the object of the enemy's shore operations; because, if that be obtained, some other position will probably be better for itself (the defending fleet).

292. Even if it (the attacking fleet) take no share in the direct attack, it will have to cover the communications of its army at the point of arrival, the most critical link of the chain connecting the army with home.

293. It can scarcely be repeated too often that when a country is thrown on the defensive, as regards its shore line, the effectual function of the fleet is to take the offensive.

204. The history of war is full of instances where sound military principles have been overridden, 1, by political or sentimental considerations; 2, by lack of military skill in commanders of fleets and armies; or 3, of moral courage to bear a great responsibility.

296. The characteristic of the offensive is that it makes the attack instead of accepting it; this is evidenced in history by the fact that almost all naval victories have been gained on the enemy's coast.

296. It is in converting inequality or inferiority into superiority at a given point that the science, or rather the art, of war consists. The principles upon which this art is based, we are assured by the best authorities, are few and simple,

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. . . . they are summed up in one great principle, that of being superior to the enemy at the decisive point, whatever the relative strength of the two parties on the whole.

297. The Archduke Charles writes: "A man can become a great captain only with a passion for study and a long experience. There is not enough in what one has seen oneself; for what life of a man is fruitful enough of events to give a universal experience; and who is the man that can have the opportunity of first practicing the difficult art of the general, before having filled that important office? It is then, by increasing one's own knowledge with the information of others, by weighing the conclusions of one's predecessors, and by taking as a term of comparison the military exploits, and the events with great results, which the history of war gives us, that one can become skilful therein.

297. The first Napoleon similarly says: Make offensive war as did Alexander, Hannibal, Caesar, Gustavus Adolphus, Tureune, Prince Eugene, Frederick the Great; read and re-read the history of their eighty-three campaigns, model yourself upon them; it is the only means of becoming a great captain and of surprising the secrets of the art. Your mind thus enlightened will make you reject maxims opposed to those of these great men. . . . . The history of these eighty-three campaigns carefully told would be a complete treatise on the art of war; the principles which should be followed in offensive and defensive war would flow from it as from a spring.

298. . . . . knowledge of the great operations of war is acquired by experience and by the study of the history of wars and of the battles of great captains.

300. Maxims of war, therefore, are not so much positive rules as they are the developments and applications of a few general principles.

301. . . . . "upon the field of battle," says the great Napoleon, "the happiest inspiration is most often only a recollection."

308. Natural jealousies and rivalries of which the phrase "The Open Door" has become the recognized expression.

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314. By "equipped" (as applied to naval station), is meant adequately fortified and garrisoned, stored with coal and all other resources, and above all with docking facilities. Abundant coal and adequate docking are the two chief demands of a fleet during hostilities.

343. . . . . It is well, however, to bear in mind that occasions may arise where two lookouts (ships) would be expedient—that is just one of the things liable to be neglected at a critical instant unless a part of an officer's habitual thought.

295. The inefficient conduct of the war (Jap-Russian) proceeded from defective grasp of principles.

400. . . . . though realizing these various dangers from the hostile "fleet in being," they (the Japs) ventured.

408. . . . . the time honored maxim, that it is not advisable for two separated bodies to seek their point of concentration inside the enemy's lines.

412. . . . . Nothing is more essential for an officer in command anywhere, be it of a single ship, or of the smallest detachment of seamen, than to remember that his own inattention to the general situation or his inefficient action, may embarrass larger interests.

419. A fleet is half beaten already when it goes into battle with one eye on something else than fighting.

420. . . . . the one thing needful, namely, to be ready to the utmost on the day of battle.

420. . . . . the one governing condition of strategy, in this war (Russo-Jap), was a naval battle under the most favorable conditions.

427. The course of the Japanese in the matters just discussed, though eminently correct, was so strictly in accord with the accepted rule as to constitute no special merit beyond that of a tenacious adherence to correct principles; a thing very hard to practice in moments of great perplexity.

It requires some grip of principle to recognize that, unless you have ships to burn, a match between ships and forts is not equal.

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428. . . . . Their (Japs) greatest contribution to naval strategy in this war was the demonstration of exaggeration in the Fleet in Being theory.

431. . . . . The two questions in case of a risk which are under consideration are: 1, does the end justify the risk; and 2, has every practicable precaution been taken to insure success.

438. . . . . It is of course a truth, certified to by experience, that troops unfit to meet regulars in the field can hold fortified lines.

447. . . . . We have such external questions in the Monroe Doctrine, the Panama Canal, the Hawaiian Islands, the market of China, and . . . . in the exposure of the Pacific coast, with its meagre population, insufficiently developed resources, and somewhat turbulent attitude toward Asiatics.

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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

THE NAVY'S PARTICIPATION AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION

By LIEUT. COMMANDER C. H. WOODWARD, U. S. Navy

In July President Woodrow Wilson, seated at his desk in the White House, will press the button which will officially open the Panama-Pacific International Exposition in San Francisco, three thousand miles distant.

The exposition, commemorating as it does the completion of the Panama Canal, an achievement that means so much to seafaring men, naturally calls for a fitting representation of the navies of the world. That the United States Government realized the importance of having the navy adequately represented in 1915 is evidenced by the fact that on March 4, 1911, four years previous to the date set for the opening, a bill was passed by Congress requesting the President to invite all maritime nations to send fleets to Hampton Roads in 1915, there to be reviewed by the President before proceeding via the Panama Canal to San Francisco.

In compliance with this request the President sent such an invitation through our diplomatic representatives abroad, and fourteen nations promptly accepted, promising to send from one to four ships, depending upon the naval strength of the nation concerned.

This, however, was previous to the present war in Europe. Seven of these nations are now actively engaged in war, consequently cannot be represented. These are Austria, France, Germany, England, Japan, Russia and Turkey. Of the remaining seven—Argentine, Greece, Italy, Norway, Portugal, Spain and Sweden—though none have officially withdrawn, several are on the "anxious seat," so that in all probability only a few foreign men-of-war will take part in this naval pageant, which otherwise would have been one of the most spectacular events of the exposition.

However, our participation will include the entire Atlantic Fleet of twenty-one battleships, together with the Pacific Fleet, and such other vessels as can be spared during this time. This, however, is subject to change.

About one month later, the President will review the Atlantic Fleet and such foreign ships as are present in Hampton Roads, just before the departure for Colon, the eastern terminus of the Panama Canal. After the adjournment of Congress, the President will go on board the *New York* at Hampton Roads and in company with the sister ship *Texas* sail for Colon. Upon the arrival of these two vessels at Colon, the President will transfer his flag to the *Oregon,* and remain on board that vessel during passage through the Canal.

It will be recalled that the long, record-breaking voyage of the *Oregon* from the west coast around South America to the Atlantic in 1898 was one of the reasons for building the Panama Canal, the completion of which the Panama-Pacific International Exposition celebrates.

The President will be accompanied on the trip through the Canal by the Secretary of the Navy; Rear Admiral Clark, who commanded the *Oregon* on her trip around the Horn; Admiral of the navy Dewey; and perhaps other members of the Cabinet.

A plan is also being considered by the Navy Department to send on board the *Oregon* for this trip such officers and enlisted men as were on board that vessel at the time she made her famous run in '98, but as a special act of Congress is necessary to re-instate the enlisted personnel for this brief service, nothing definite can be done until Congress acts in the matter.

Upon the arrival of the *Oregon* at Balboa, the western terminus of the Canal, the formal celebration of the opening of the Canal will be held, after which the President will again go aboard the *New York* and proceed to San Francisco at the head of the fleet. After four days at the exposition, the President will return to Washington by private car.

The present plan of the Navy Department is to keep the entire fleet in San Francisco for at least a month, and then to send divisions to various ports; as, Honolulu, Puget Sound, San Diego, etc., relieving one another from time to time, in order to give the officers and men an opportunity to visit the various ports on the

west coast, and to give the people of the west coast a chance to see the various ships of the navy.

During the visit to San Francisco the greater part of the fleet will probably anchor to the eastward of the city, where the Board of State Harbor Commissioners have set aside such part of the water front as is necessary, between the Ferry Building and Folsom Street, for their accommodation. Plans have been prepared and work is now under way for the installation of all necessary floats, landing stages, telephone booths, waiting-rooms and other conveniences to minister to the comforts of the visiting officers and men.

A few hundred yards off the exposition site throughout the exposition period, however, there will be a squadron of naval vessels anchored, which will include every type from superdreadnaught to submarine.

The *Olympia* (Admiral Dewey's flagship at the battle of Manila Bay) and the *Oregon* will be moored alongside the sea-wall of the exposition near the Palace of Machinery.

The hospital ship *Solace* will also be moored in the vicinity of the *Oregon* and *Olympia*.

It is the Department's plan to have the *North Carolina* (the navy's aeronautic ship) present during the exposition to care for the naval aerial flotilla, but as she is in the Mediterranean at present, it may not be possible to detach her for this service. However, daily flights will be made.

A division of submarines will also be stationed in San Francisco Bay throughout the greater part of the exposition, and will give frequent exhibitions of diving and other interesting maneuvers.

In addition to the reserve torpedo flotilla, consisting of four destroyers, which will be at Sausalito during the most of the exposition period, the Pacific Flotilla in active commission will pay occasional visits to San Francisco Bay for maneuvers and practice off the exposition grounds.

About three-fourths of the entire government exhibit is being sent to San Francisco, via the Canal, on the naval collier *Caesar*, which sailed from Washington on December 16. The remainder will be sent by rail in January.

The *Caesar* is due to arrive in San Francisco about January 15. Immediately upon arrival, the exhibits will be installed in their various palaces.

There has been collected, for this occasion, one of the most interesting and instructive exhibits the Navy Department has ever made. It will be divided between the Palace of Machinery and the Palace of Liberal Arts, the larger part of which will be installed in the former building.

One of the chief features of the exhibit in the Palace of Machinery, which will occupy two large sections, will be the display of 38 models of vessels of the navy. These will include: our latest super-dreadnaught *Oklahoma;* the *Utah,* the *Virginia,* the *Oregon,* the *San Marcos* (which, in her later days, was used as a target for the fleet), the *Tennessee,* the *Brooklyn,* the *Ozark,* the *Atlanta,* the *Salem,* the *Annapolis,* the *Cumberland,* the *McCall,* the *Shubrick,* the *Holland,* the *Neptune* and the old ram, *Katahdin,* thus taking in every type of vessel in the navy.

A sectional model of the *Connecticut* will show the "inside works" of a modern battleship.

There will also be a complete working model of the floating drydock *Dewey,* which is now at Olongapo, Luzon, and a model of the latest graving dock of the New York Navy Yard showing battleship in dock. Near by will be a model of the floating crane in use at the Boston Navy Yard.

The submarine exhibit, Naval Observatory transit instruments and display of wireless outfits, including a model radio plant, will also be of interest.

Among other things to be found on board ship, which will be shown, are the following: torpedo, gyroscopic compass, semaphore, searchlight, range finder, sounding machine, engine-room telegraphs, binnacle and wheel, submarine periscope, chronometer, sextant and other navigational instruments, charts, signal outfit, athletic outfit, and panels showing the various knots and splices used by seamen.

Another exhibit which will be of interest is a large framed picture showing the advancement in the marine engine from Robert Fulton's day to the present time. A small, modern triple expansion engine, weighing over 4000 pounds, will also be shown.

Another feature will be a display of powder and projectiles used in the navy, from .30 caliber rifle ammunition to 14-inch shells used by our latest battleships.

A revolving cyclorama will also be installed, showing pictures of ships of the old and new navy. This cyclorama will be provided with 16 booths.

Two display cases from the Yards and Docks Bureau will complete the exhibit in this building.

The remainder of the naval exhibit, located in the Palace of Liberal Arts, will include a model of the old *Maine,* which was blown up in Havana harbor on February 15, 1898, and a case containing relics of that historic ship.

Numerous other naval relics will also be displayed.

Models of three of the vessels of the old navy will be exhibited. They are the *Constitution,* the *St. Lawrence* and the old ship-of-the-line *North Carolina.*

A plaster cast model of the new Naval Academy will give a correct idea of the general appearance and arrangement of its buildings. A Naval Academy exhibit including a board showing the work of midshipmen will also be among the sights of interest in this section.

Wooden models of old guns, from the 18-pounder used in the Revolutionary War to the 15-inch smooth bore of Civil War times and a more modern 6-inch breech-loading rifle, will form a part of this exhibit.

An exhibit from various artificer schools maintained at the different navy yards will be shown.

Figure-heads of the *Constitution* and the *Olympia* will be shown.

Replicas of medals awarded to naval officers at different times in our history will also make an interesting feature of the exhibit.

A number of moving picture films showing the fleet at maneuvers, target practice, etc., and many other interesting features of naval life will also be exhibited for the edification of the public. These will be shown in the government exhibit lecture-room which is located in the northwest corner of the Machinery Palace.

The marine corps, by means of a special auto-projectoscope, will show many service views on the screen.

A full battalion of marines, numbering three hundred officers and men, together with a band of twenty pieces, will be stationed at the exposition throughout the whole period.

This battalion will occupy a model camp located on a tract 460 by 200 feet. On another tract 200 feet square, just across the

Federal Concourse, the camp kitchen, guard tents, etc., will be placed.

The battalion will be used for exhibition purposes and as a guard of honor for notable visitors. The usual camp routine will be followed, including daily drills and dress parades and other military ceremonies.

During the fleet's visit an athletic tournament will be held under the joint auspices of the exposition and the Army and Navy Y. M. C. A. In addition to the usual boat races, sailing and rowing, track events of all kinds will be held on the big athletic field on the exposition grounds between the men of the sister services.

The annual practice cruise of midshipmen next year will be made to San Francisco. Both the Secretary of the Navy and Rear Admiral Fullam, Superintendent of the Naval Academy, are agreed on this. Such a visit will be a splendid thing for the education of the midshipmen.

Three of the older battleships now in reserve at Philadelphia will probably be used for the training squadron, as has been done during the past few years. Their presence at the exposition will not only increase the number of ships of our fleet here at the time of their visit but will allow the midshipmen to take advantage of the opportunities offered by such a visit. They will not only have a chance to take in the exposition but will inspect the Canal, en route, and also see something of the west coast. As the cruise will last about three months, this will allow them between three weeks and a month in San Francisco.

This will be the first cruise, since the establishment of the Naval Academy, that the midshipmen have visited the Pacific Ocean; as, heretofore, cruises have always been made in the North Atlantic.

NOTE.—These plans are, of course, subject to change.

DISCUSSION

Can the Graduation of the Compass into Points be Dispensed with?

(See Page 1659, Whole No. 154, November-December, 1914)

Commander W. V. Pratt, U. S. Navy.—Prof. Maurer's article in the November-December, 1914, Proceedings, "Can the Graduation of the Compass into Points be Dispensed with," is excellent. He has taken the good features of the point division system, so useful to the seaman, and blended them with the tactical compass, as represented by the 0 to 360 division. In addition he has made the tactical compass much more mobile by his 15° swings.

The trouble with any 0 to 360 markings without points or similar characteristic markings is, that on wet, foggy, nasty nights when coasting or in pilot waters it is not fool proof, and Prof. Maurer's compass apparently is.

U. S. NAVAL INSTITUTE

SECRETARY'S NOTES

Annual Dues. The annual dues for 1915 become payable on January 1, 1915. There is no change in dues on account of bi-monthly publication. It is suggested that dues be paid in lump sums covering a period of two to five years; this method of payment has advantages for members as well as for the Institute and is practiced by a number of members, both regular and associate. Response to this notice will save the Institute a considerable sum in stationery and postage.

Special Notice. It is believed that the scope of usefulness of the PROCEEDINGS to members of the Institute can be increased and all members are invited to assist in this work. Should any topic occur to you on which you think an article could well be written, or on which you would like to read one, send such topic to the Secretary and Treasurer, together with such explanation or comment as may appear desirable in order that the intent of the suggestion may be clearly understood. The Institute is desirous of obtaining good "sea yarns" for publication. It is hoped that anyone who can spin such a yarn will submit it.

References. Attention is invited to the following articles which have appeared in the pages of the PROCEEDINGS during the past two years; they treat of subjects which closely concern Naval War College work; a perusal of them should prove profitable:

1912

Co-ordination Before and During War. By Captain F. K. Hill, U. S. N.; page 563, Whole No. 142, June, 1912.

Relations of the War College to the Navy Department. By Captain W. L. Rodgers, U. S. N.; page 835, Whole No. 143, September, 1912.

Notes on the Applicatory System of Solving War Problems, with Examples Showing the Adaptation of the System to Naval Problems. By Members of the Staff, U. S. Naval War College; page 1011, Whole No. 143, September, 1912.

The Strategic Naval War Game or Chart Maneuver. By Captain W. McCarty Little, U. S. N.; page 1213, Whole No. 144, December, 1912.

The Naval War College Course. By Captain W. L. Rodgers, U. S. N.; page 1235, Whole No. 144, December, 1912.

Mental and Moral Training for War. By Surgeon J. F. Leys, U. S. N.; page 1241, Whole No. 144, December, 1912.

1913

Trained Initiative and Unity of Action: The True Bases of Military Efficiency. By Lieutenant Commander D. W. Knox, U. S. N.; page 41, Whole No. 145, March, 1913.

Logistics: Its Bearing on the Art of War. By Commander C. T. Vogelgesang, U. S. N.; page 63, Whole No. 145, March, 1913.

Column as a Battle Formation. By Lieut. Commander D. W. Knox, U. S. N.; page 949, Whole No. 147, September, 1913.

The Naval War College, the General Board and the Office of Naval Intelligence. By Commander W. S. Crosley, U. S. N.; page 965, Whole No. 147, September, 1913.

Scouting and Screening Operations. By Lieut. Commander W. S. Pye, U. S. N.; page 1139, Whole No. 147, September, 1913.

Organization of the Fleet for War. By Lieutenant R. E. Ingersoll, U. S. N.; page 1739, Whole No. 148, December, 1913.

Bureau of Information

The Institute offers its services as a "Bureau of Information" on professional questions and will endeavor to obtain replies from the best qualified sources. Those "Questions and Answers" which are suitable for purposes of general information, will appear in the PROCEEDINGS. It is suggested that knotty questions which come up in professional examinations for promotion may well be submitted to this department.

Membership

Since November 16, 1914, 205 regular and 74 associate members have joined the Institute. The following members have died:

Captain M. H. Signor, U. S. N., Retired.
Rear Admiral A. T. Mahan, U. S. N., Retired, and
Rear Admiral H. L. Howison, U. S. N., Retired.

The need for more members continues; bi-monthly publication should make the PROCEEDINGS more than ever valuable and necessary in keeping up with the naval profession; all members are asked to help in increasing the membership.

Notice

Whole Nos. 145 and 149 of the PROCEEDINGS (March, 1913, and Jan.-Feb., 1914) are exhausted; there are so many calls for single copies of these numbers that the Institute offers to pay for copies thereof returned in good condition at the rate of 25 cents per copy.

Address of Members

Members, especially those on the retired list, and civilians are urged to keep the Secretary and Treasurer informed of the address to which PROCEEDINGS are to be sent, and thus insure their receipt.

Prize Essay

The Prize Essay for 1915 will appear in the March-April number. Twenty-four essays were submitted in competition.

ANNAPOLIS, MD., JANUARY 16, 1914.

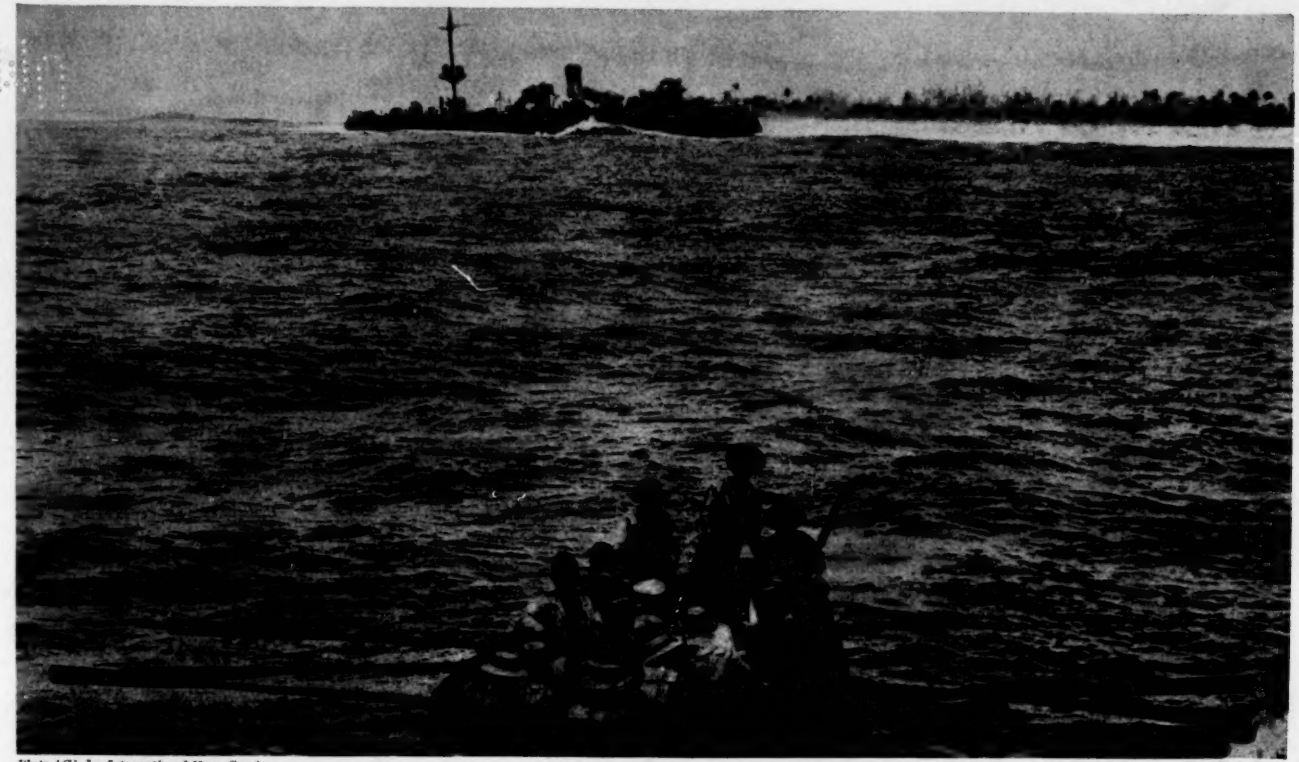

Photo (C) by International News Service *New York Times*

THE END OF THE FAMOUS GERMAN CRUISER "EMDEN," BEACHED ON COCOS ISLAND
The Australians are removing from her the prisoners of war

PROFESSIONAL NOTES

Prepared by LIEUTENANT C. C. GILL, U. S. Navy

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NAVAL POWERS

ARGENTINE REPUBLIC

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Rivadavia.....	27,940	22.5	12 12-in., 12 6-in., 16 4-in.	Fore River Co.	Completed
Moreno.....	27,940	22.5	same	New York Co.	Completed

NOTE.—Argentine has four destroyers, displacement 950 tons, contracted for (two built at Nantes and two at Bordeaux), launched in 1911 but not yet turned over to the government. Also four additional destroyers of about 950 tons to replace those sold to Greece, building at Krupp's Germania Works. (It is presumed that these destroyers have been taken over by France and Germany respectively, as war measures.)

AUSTRIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Prinz Eugen..	20,010	20	12 12-in., 12 5.9-in., 18 12-pdr.	Trieste	Commissioned
Szent Istvan..	20,010	20	same	Fiume	Launched Jan. 17, 1914
Ersatz Mon'ch	24,500	22½	10 14-in.	Trieste	To be laid down, 1914
" Budapest	24,500	22½	same	"	" " " " 1914
" Wien....	24,500	22½	same	Fiume	" " " " 1914
" Hapsburg	24,500	22½	same	Trieste	" " " " 1915
Small Cruisers					
Saida.....	3,454	27	9 4.1-in.: 2 6-pdrs.	Montalcone	Trials Apr., 1914
Helgoland	3,454	27	same	Fiume	Launched Nov. 23, 1912
Novara.....	3,454	27	same	"	" Feb. 15, 1913

NOTE.—Three destroyers launched in 1913, displacement 787 tons, nearing completion. Two submarines, displacement 550 tons, and three of 860 tons, contracted for in 1912 are to be built by Krupp Co. There are also 27 torpedo boats of 250 tons displacement in various stages of construction. In lieu of definite information regarding progress in ship construction since outbreak of war conjectures may be based on dates in column headed "Remarks."

NEW MONITORS.—Though the government has seen fit to keep this news from the foreign and even the home press, it is a fact that recently a monitor of a more powerful type than the *Bodrog* class has been put in commission and that another of these vessels is now being finished in the Budapest government yard. It is understood that two other monitors of this type are nearing completion and that the keels for a number of others have been laid. Work on them is being hurried.

The new monitors have double the armament of the *Bodrog* and the *Temes* class. They are armed with three instead of two long range guns, and these are of a slightly larger caliber than those installed on board the *Bodrog*. Moreover, the thickness of the turret armor has been materially increased. Instead of carrying one high angle piece, as do the monitors of

the older class, the new vessels will be armed with two, in half turrets aft, while the quick-fire pieces on the upper deck will be increased from two to four, and the machine guns from one to six. It is believed that this fleet will be an important factor in the defence of the Danube and Save rivers.—*N. Y. Herald*, 12/26.

NEW BATTLESHIPS.—The time provided for the construction by the *Stabilimento Tecnico Triestino* of the new 25,500-ton Austrian battleships is only thirty months. These battleships are two in number, marked *VIII* and *IX;* one was commenced in August last, and the other last October. They are each to be armed with ten 13.8-inch guns, fourteen 5.9-inch guns, twenty 3.5-inch guns, and four or six torpedo tubes. The 1914 naval program provides for two further 24,500-ton battleships, marked *X* and *XI*, to be commenced in 1915, and completed in 1917. A contract has been given to the Skoda Works, Pilsen, for the construction of forty 13.8-inch guns, sixty 5.9-inch and a number of small-caliber guns. The 18,000 tons of armor required will be supplied by the Witkowitz Works.—*Shipping Illustrated*, 1/2.

BRAZIL

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleship Rio de Janeiro	28,000 to 30,000	..	8 or 10 15-in.	Armstrong, Whitworth & Co.	Contracted for Feb., 1914

NOTE.—Three submarines, contracted for in 1912, to be built at Spezia, displacement 330 tons, were ready Aug. 1, 1913, and two have been turned over to the government.

CHILE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Almirante Latorre	28,000	23	10 14-in., 16 4.7-in.	Armstrong, Whitworth & Co.	Launched Nov. 27, 1913
Almirante Cochrane	28,000	23	same	"	Laid down Jan. 22, 1913

NOTE.—Of the 6 destroyers of 1830 tons, built by J. S. White & Co., two have been completed. Two submarines of 420 tons displacement have been contracted for to be built by Elec. Boat Co., Seattle. (Vessels building in England have been taken over by that country as a war measure.)

A decree has been issued by the Chilean Government restricting the amount of coal which belligerent warships and merchant craft may obtain in Chilean ports. The decree represents the suggestion of Chile to other Pan-American nations of a means of excluding belligerent warships from this hemisphere. Great Britain already has formally advised Chile that she will abide by the regulations of the decree, which provides "that the supplies of coal which may be furnished to warships of the belligerent nations at

Chilean ports shall be reduced to the quantity necessary to enable them to reach the nearest coaling port of the neighboring nation, and that the quantity of coal that may be supplied to merchant vessels be limited to the capacity of their ordinary bunkers, unless they desire to sail direct to European ports, in which case they may be supplied with the quantity of coal necessary for the voyage, provided always that the company to which they may belong furnish a sufficient guarantee, in the opinion of the government, that the fuel shall be used exclusively in effecting such voyage."—*Shipping Illustrated, 12/26.*

CHINA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Light cruisers					
Fei-Hung	2,600	22½	2 6-in., 4 4-in., 2 3-in., 6 3-pdr.	N. Y. Ship Bldg. Co.	Sold to Greece
.....	4,800	27	.....	Monfalcone	Ordered Nov., 1913
.....	1,800	24	.....	"	Contracted for Sept., 1913
.....	1,800	24	.....	"	same
.....	1,800	24	.....	"	same

NOTE.—Four destroyers, displacement 400 tons, are building, one at Trieste and three at Schichau. The three Schichau boats have been delivered.

DENMARK

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Niels Juel.....	3,675	16	2 9.4-in., 4 5.9-in.	Copenhagen	Laid down Sept., 1913

NOTE.—Three destroyers are under construction at Copenhagen and three submarines, displacement 200 tons, are being built by Whitehead Co. (The submarines have probably been taken over by England).

FRANCE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
France	23,092	20	12 12-in., 22 5.5-in.	St. Nazaire	Commissioned
Paris.....	23,092	20	same	La Seyne	"
Bretagne.....	23,172	20	10 13.4-in., 22 5.5-in.	Brest	Launched April 21, 1913
Provence.....	23,172	20	same	Lorient	" April 20, 1913
Lorraine	23,600	20	same	St. Nazaire	" Sept. 30, 1913
Languedoc....	24,828	21.5	12 13.4-in., 24 5.5-in.	La Seyne	Laid down April 28, 1913
Normandie....	24,828	21.5	same	St. Nazaire	" July 5, 1913
Flandres.....	24,828	21.5	same	Brest	" Oct. 10, 1913
Gascogne.....	24,828	21.5	same	Lorient	" Oct. 1, 1913
Bearn	24,828	21.5	same	La Seyne	Contract Jan. 7, 1914

NOTE.—There are approximately six destroyers and 23 submarines under construction.

Mr. Augagneur, French Minister of Marine, reveals that fresh ships have been added to the divisions, and the fleet's losses have been confined to two auxiliaries—a submarine and a destroyer—and excluding the additions promised before spring the fleet is to-day "sensibly stronger than it was five months ago."

From other authoritative sources it is gleaned that the test of service has proved the completeness of the new organization proposed by Admiral de Lapeyrère, now the Admiralissimo, and carried forward by the Conseil d'Amirauté. Despite prolonged cruising the large ships are self-sustaining in repairs and relatively free from defects; the reserves of ammunition and torpedoes exceed the needs of service, and the substitution of the 18-inch Creusot torpedoes for the Fiume type has turned out to be a lucky change for the fleet.

Best of all, it is asserted that the spirit of the officers and men is very high, and after four months of blockading operations and of daily resistance to a skilled enemy, inspired by the highest traditions, the fighting value of materiel and personnel is greatly augmented. One notable lesson gathered from experiences against Austrian submarines is that the antidote to the assaults of that weapon is said to be tactical rather than structural—that is, speed, alertness and maneuvering as opposed to armoring the underwater bodies of ships.—*N. Y. Herald*, 1/2.

GERMANY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Grosser Kurfürst	26,575	23	10 12-in., 14 5.9-in., 12 3.4-in.	Hamburg	Commissioned
Markgraf	26,575	23	same	Bremen	"
König	26,575	23	same	Wilhelmshaven	"
Kronprinz	26,575	23	same	Germania	Launched Feb. 21, 1914
Ersatz Worth	29,000	....	8 15-in., 16 5.9-in.	Kiel	Laid down Sept., 1913
"T" 1913	29,000	....	same	"	" May, 1913
Ersatz Friedrich III	30,000	....	8 15-in., 18 5.9-in.	....	" summer 1914
Cruisers of the Line					
Lützow	28,000	28.5	8 12-in., 14 6-in.	Dantzig	Launched Nov. 29, 1913
Derfflinger	26,500	28.5	same	Hamburg (Blohm & Voss)	Commissioned
Ersatz Hertha	28,000	28.5	8 12-in.	Wilhelmshaven	Laid down July, 1913
Ersatz Victoria Louise	.....	....	....	....	" summer 1914
Protected Cruisers					
Karlsruhe	4,900	28	12 4.1-in., 2 t. t.	Germania	Commissioned
Rostock	4,900	28	same	Howaldt	"
Regensburg	4,900	27.5	12 4.1-in.	Bremen	"
Graudenz	4,900	27.5	12 14.1-in.	Kiel	"
Ersatz Hela	5,500	27.5	10 6-in.	"	Laid down fall 1913
Ersatz Gefion	5,500	27.5	same	Stettin	" "
Ersatz Niobe	.....	....	....	....	" summer 1914
Ersatz Gazelle	.....	....	....	....	same

NOTE.—Germany has twelve destroyers and twelve or more submarines under construction. Tonnage of ships building uncertain. Changes in construction program because of war are problematical.

We read in the September issue of the *Rivista Marittima* that it has been decided to hasten the execution of the German naval program under the Act of 1912, which included 12 flotillas of 12 destroyers each, six flotillas of

six submarines each, besides mine-laying and other ships. It has been further decided to commence immediately the construction of the ships provided for 1915—*i. e.*, three large battleships and two vedette ships. Arrangements have been made with a view to reducing the active life of ships to 15 years. The Navy Board have been given the right of building any type they may deem necessary in the place of large units. The power of production of the German yards is such as to enable them to give a marked impulse to such new construction. The time required for the construction of a dreadnought is longer than the probable length of the war, but the smaller units can be built more rapidly; hence, no doubt, the initiative granted the Navy Board above referred to. For example, a considerable number of submarines can be built in a short period, when the work resolves itself in the reproduction of a type actually in the service. Twelve destroyers, *Nos. 37* to *48*, provided for in the 1914 program, have been ordered, half from the Germania yard, Kiel, and half from the Vulcan yard, Stettin.

The submarines provided for in the present budget are six in number. It is stated that the *U 21* was the first of a new type of which seven units are already in the service—*i. e., U 21* to *27*. Their dimensions are said to be: length, 65 m. (213 feet); breadth, 6.10 m. (20 feet); whilst the boats of the preceding type have a length of only 39 m. (128 feet). There are 27 submarines in the service. The six new boats are said to have a displacement on the surface of 900 tons, and a speed on the surface of 20 knots; the radius of action is said to be 2000 miles. They are to be armed with two types of guns, one of 88 mm. (3.5 inches) on a disappearing mounting, and one of 37 mm. (1.4 inches) on a fixed pedestal. A description of this type of gun was given in *Engineering*, vol. xcv, page 333. It is stated that the German Navy, which now uses 500 mm. (19.685-inch) torpedoes, has designed a new type of 550 mm. (21.653 inches), having a maximum speed of 38 knots and a range of 7000 meters (3.77 miles) at an average speed of 29 knots. The speed of this type is probably somewhat below that of the recent types of torpedoes of other navies; its charge is said to weigh from 130 kg. to 135 kg. (292 lbs.).

Whilst recognizing the marked advantages of liquid fuel over coal, in that it takes up 40 per cent less space, whilst having 25 per cent more efficiency for an equal weight consumed and reducing the number of stokers, the *Suddeutsche Zeitung*, says the *Revista*, records that Germany has decided to maintain the use of coal for firing her ships' boilers in ordinary circumstances, having recourse to liquid fuel as an adjunct when high speeds are required. The use of liquid fuel on a larger scale would render Germany dependent upon the United States or Roumania. A number of shipping and shipbuilding firms intend building at Hamburg a large Froude tank. The dimensions contemplated are as follows: Length, 330 m. (1082 feet), in two compartments, one 8 m. (26 feet) wide and 650 m. (21 feet 4 inches) deep, and one 16 m. (52 feet 6 inches) wide and 7.50 m. (24 feet 7 inches) deep. The models would be about 11 m. (36 feet) in length, and could be propelled up to a speed of 40 km. per hour (21.6 knots). The tank is to be of reinforced concrete, and will contain 28,000 tons (6,160,000 gallons) of water.—*Engineering*, 12/4.

OCEAN-GOING SUBMARINES FOR THE GERMANS.—A correspondent of one of the London daily papers at Copenhagen, speaks of a report from Hamburg to the effect that two unusually large submarines have been completed for the German Navy and are making trial trips at the mouth of the Elbe. According to the report these submarines are four times the size of any existing vessels of this type, with a radius of action which will enable them to keep at sea for 40 days without having to replenish their oil tanks and stock of stores, or even have recourse to the submarine tender. This would mean a submarine running into the thousands of tons displacement. Such vessels will be built, and at no very distant date. It is quite conceivable that, in view of the enormous offensive power of such a craft, the Germans may

be springing a surprise in underwater craft similar to that which they gave with the 16-inch gun in siege artillery.—*Scientific American*, 12/12.

A VISIT TO THE GERMAN FLEET.—The special correspondent of the *New York Tribune*, under date Kiel, November 24, sends a long account of "a day with the Kaiser's Navy." He reports that the Germans appear to be banking on a new "super-dreadnought-submarine," one of which is *U 32*.

He boarded the *Markgraf* and found "all the gun-crews being driven at top speed, some in pantomime shadow, others with real shells." The correspondent proceeds:

"About five hours a day of gun drill are now the rule, I was told, as many men among the reservists need plenty of work. They looked a particularly fine set of men, and went at their work as if playing a game. The first lieutenant invited the American visitor to the forward turret, where he proudly put his two 12-inch guns through their paces. The English dreadnought is about seven miles away, the lieutenant suggested, and then blew a tin whistle and the gun crews stood at attention. For the next 10 minutes pandemonium reigned in the turrets. A touch of realism was added when one of the 12-inch guns jammed, and when the lieutenant shouted the last desperate order, which is given when a whole gun crew has been put out of action, and from below a fresh lot of gunners swarmed up to take their places. 'I can fire one shot every 20 seconds—that is to say, each gun every 40 seconds,' the lieutenant explained.

"All the 6-inch guns on both sides of the *Markgraf* were in mock action. In the hospital wards others were getting practical instruction in first-aid work, while the more seriously wounded were being placed on the operating tables. Elsewhere in the dreadnought imaginary fires were being extinguished and every possible contingency was being practised for.

Torpedo Practice.—"Perhaps the most interesting of all was the torpedo practice under battle conditions. To save time, the water was not pumped out of the torpedo tubes before reloading as in peace practice, but allowed to flood the room inches deep. Here, too, the men were being driven along under high pressure and were timed. The fast time of one minute five seconds was registered for swinging a torpedo down from the ceiling, where six spare torpedoes were fastened, ramming it into the torpedo tube, and making ready to fire."

The correspondent made a tour of the big navy yard, where 8000 men were working by day and 3000 by night. It was adready dark and the work of turbine and boiler building and so forth was carried on by the light of only a few small lanterns. He notes as "most significant" the fact that the work was "not being pushed in those fighting ships under construction which could not possibly be finished under a year, while the main effort was being devoted to those which would be in fighting trim in three months or less." At Friedrichsort another 3000 men were working night and day making torpedoes and torpedo tubes.

Awaiting the Day.—The correspondent reports as noticeable the uniformity in the conversation of the officers at Kiel. "All were looking forward to taking their part in the great deciding naval engagement, all were certain that it would come, and all equally scouted the idea that the German ships were afraid to come out and fight. 'The English will find German warships in the North Sea now if they go to look for them,' one officer remarked. The British numerical superiority is chiefly in smaller ships. Another said, 'In dreadnoughts we are not at such a great disadvantage. But mere superiority in tonnage and metal-throwing ability will not be the deciding factors in the great battle.' None of the officers, however, is willing to hazard a guess when the big battle will take place."—*London Times*, 12/21.

GREAT BRITAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Benbow	25,000	22	10 13.5-in., 16 6-in.	Beardmore	Commissioned
Emperor of India	25,000	22	same	Vickers	Commissioned
Iron Duke	28,000	22	same	Portsmouth	Commissioned Mar., 1914
Marlborough	25,000	22	same	Devonport	Trials Mar., 1914
Qu'n Eliz'b'h	27,500	25	8 15-in., 16 6-in.	Portsmouth	Launched Oct. 16, 1913
Warspite	27,500	25	same	Devonport	" Nov. 26, 1913
Valiant	27,500	25	same	Fairfield	" Dec., 1913
Malaya	27,500	25	same	Walker	Laid down Oct. 20, 1913
Barham	27,500	25	same	Brown & Co.	Launched Feb., 1914
Roy'l Sover'gn	25,500	21	same	Portsmouth	Laid down, Jan. 15, 1914
Royal Oak	25,500	21	same	Devonport	" Jan. 15, 1914
Resolution	25,500	21	same	Palmer	" Nov. 28, 1913
Ramillies	25,500	21	same	Beardmore	" Nov. 12, 1913
Revenge	25,500	21	same	Vickers	" Jan., 1914
Battle Cruisers					
Tiger	30,000	30	8 13.5-in., 12 6-in.	Brown & Co.	Launched Dec. 15, 1913
Light Cruisers					
Brisbane	5,400	25	9 6-in., 4 3-pdrs.	Sydney	Laid down Jan. 25, 1913
Birmingham	5,440	25.5	same	Elswick	Commissioned, Feb. 3, 1914
Lowestoft	5,440	25.5	same	Chatham	" Apr. 21, 1914
Nottingham	5,440	25.5	same	Pembroke	" Apr. 3, 1914
Aurora	3,600	30	2 6-in., 8 4-in.	Devonport	Commissioned
Arethusa	3,600	30	same	Chatham	Commissioned
Penelope	3,600	30	same	Barrow	Laid down Feb. 1, 1913
Phaeton	3,600	30	same	"	" March 12, 1913
Royalist	3,600	30	same	Dalmuir	" June 3, 1913
Galatea	3,600	30	same	"	Commissioned
Inconstant	3,600	30	same	"	Laid down April 3, 1913
Undaunted	3,600	30	same	Govan	Commissioned
Cleopatra	4,400	30	.....	Devonport	Laid down Feb. 26, 1914
Calliope	4,400	30	.....	Chatham	" Jan. 1, 1914
Conquest	4,400	30	.....	"	" Feb. 28, 1914
Cordelia	4,400	30	.....	Pembroke	Launched Feb. 23, 1914
Carysfort	4,400	30	.....	"	Laid down Feb. 25, 1914
Comus	4,400	30	.....	Wallsend	" Nov. 3, 1913
Caroline	4,400	30	.....	Birkenhead	" Jan. 28, 1914
Champion	4,400	30	.....	Hebburn	" Feb. 28, 1914

NOTE.—England has approximately 31 destroyers and 24 submarines under construction. (Changes in construction program since war are unknown).

No less than fifteen new battleships, with the last word of science crowded into their vast tonnage, are to be added to the first fighting line of our navy during the next twelve months—*i. e.*, before the end of 1915. During the same period the Germans will apparently expand their navy on which they depend to smash our grand fleet, by three only of this type of ship. Both fleets will, of course, add smaller fighting craft during the same period; but here, again, the British additions will be far larger than those to the squadrons of her opponents.—*United Service Gazette*, 12/10.

The October Navy List was corrected down to September 15, and it shows that since the war began the following vessels have been commissioned for sea:

Four battleships of the dreadnought type: The *Agincourt* (of 27,500 tons), the *Benbow* (of 25,000 tons), the *Emperor of India* of (25,000 tons), and the *Erin* (of 23,000 tons). These vessels embody all the latest offensive and defensive powers. They mount thirty 13.5-inch guns, throwing a

1400-pound projectile; fourteen 12-inch guns, using an 850-pound projectile; and sixty 6-inch guns, with a 100-pound shell.

One battle-cruiser of the dreadnought type: The *Tiger*. This vessel, of 28,000 tons, carries eight 13-inch and twelve 6-inch guns, thus raising the aggregate number of new battle-guns to fifty-two, with seventy-four 6-inch guns.

Four armored cruisers: The *Arethusa, Aurora, Galatea,* and *Undaunted.* These vessels displace 3750 tons, have a speed of 29 knots, and each mounts two 6-inch and eight 4-inch guns.

Three armored cruisers or monitors: *Humber, Mersey,* and *Severn.* These vessels were purchased from the Brazilian government on the outbreak of war. They represent a type unique in the Royal Navy. Displacing 1260 tons, these gunboats can steam at 11½ knots. They are designed to operate in shallow water, and draw only 4½ feet at full load. The armament of each vessel consists of two 6-inch guns, two 4.7-inch howitzers, and four 3-pounders.

Two flotilla leaders: The *Broke* and *Faulknor.*. These very big destroyers have a displacement of 1600 tons, a speed of 31 knots, and carry six 4-inch guns in addition to three torpedo tubes.

Eight large destroyers: The *Lance, Laverock, Leonides, Lookout, Lucifer, Meteor, Minos,* and *Miranda.* The vessels of the *L* class displace about 1000 tons, have a speed of 29 knots, carry three 4-inch guns, and have four tubes for discharging the 21-inch torpedo. The craft of the *M* class, of which ten others are completing, are larger, displacing 1200 to 1350 tons, and more powerful.

NEW RECORD IN CRUISER CONSTRUCTION.—The Secretary of the Admiralty makes the following announcement through the press bureau: "An interesting record in ship construction has been established in the building, at Messrs. Cammell, Laird & Co.'s yard at Birkenhead, of his Majesty's new light cruiser *Caroline.* Her keel was laid on January 28, 1914; she was launched on September 21, and delivered complete on December 17, after satisfactory trials on December 15, the contract date of delivery having been May 21, 1915.—*The Engineer,* 12/18.

NEW AUSTRALIAN DESTROYER.—An Australian destroyer was launched December 19 at Sydney, N. S. W. Except for the plates, the vessel has been constructed of Australian materials by Australian workmen.—*Shipping Illustrated,* 1/2.

LORD ROBERTS.—Lord Roberts has died almost on the battlefield, which was what the good warrior would have wished. His death in France came as a sudden and painful surprise. Not only the whole British race, but all who admire genius, valor, and virtue will mourn his loss. He died as he would have lived—a soldier doing his duty. For he would have been with us to-day had he not crossed the Channel to greet the Indian troops fighting for the Empire in France. In the same way he gladly emerged from the retirement he had well earned when his country needed him during the black week of the South African War, and again when he set forth, alas! in vain to rouse younger men to the need for military training and to a sense of the danger to the empire which his prescience and clear vision foresaw. So often he had served his country that Lord Roberts never until the last dismissed the grand thought that the country would want him again. "For 19 years I have led an abstemious life in the hope of this day," he said to Lord Lansdowne when he was asked to go out to get the British Army out of the entanglement in which it was supposed to be involved in South Africa in December, 1899. He had kept himself "fit" mentally and physically in the hope that he could again be of service to the land he loved.

The Power of Example.—Lord Roberts did more than win battles. He won the hearts of men. Few personages who have lived so prominently in the public eye and fought so many battles had the good fortune to enjoy such an immunity from adverse criticism from a race of faultfinders. The Field Marshal's personality profoundly impressed not only those who knew him, but people who had never seen him. Gratitude for the services he had rendered to the country was not enough to account wholly for this. It was due to a passionate admiration for the man, fostered doubtless by the good reports carried home by his soldiers, who held him in veneration. "Bobs" had fine individual traits and pleasing idiosyncrasies of temperament. In private life he was known as the gentlest of husbands and the most lovable of fathers. As a host he had a knack of impressing the guest with the idea that he was deeply interested in all he had to say, and never appeared bored with the most stupid of callers. A good and vigorous speaker in public, he was always convincing, because the transparent sincerity of the man commanded sympathy. Quick to discover real merit, he was never deceived by cunning tongues, and he gathered round him the ablest military men of his time. He led the simple life. His wants were few; everything bordering on luxury was rigorously eschewed. Lord Roberts was a strict teetotaler, and enjoined temperance on all soldiers. Indeed, his life was regulated by stern moral strength. A deeply religious man, and a praying man in the best sense of the term, his life was pure and good.—*Naval and Military Record*, 11/18.

THE LATE ADMIRAL CRADOCK.—Many generous tributes have been paid to the personality and courage of the late Rear Admiral Sir Christopher Cradock. In the *Times*, a correspondent signing himself "B. B." refers to his good work in Mexico during the eight or nine months previous to the war, and says that "it was owing to the courage, sincerity, and courtesy of the British admiral that the lives of hundreds of Europeans and Americans were saved and much property protected from damage. Admiral Cradock claimed no talent for diplomacy, but he was tireless in his exertions, and his straightforwardness and sincerity made him completely trusted by those with whom he had diplomatic relations." It has often been said that naval officers frequently make good diplomatists, and the services rendered by Sir Christopher Cradock under trying and difficult conditions in Mexico bear out the statement. Perhaps it is because, as he himself said in his inimitable book, "Whispers from the Fleet," it is recognized that the sailor's training brings to the seniors broad open minds and much common sense. Hence confidence is inspired in the judgments of such men. In the *Morning Post*, Admiral Sir Francis Bridgeman reveals the high estimation in which Admiral Cradock was held by his brother seamen. "Courageous almost to a fault," says Sir Francis, "a splendid seaman, and the most experienced cruiser admiral the navy possessed, it is only fitting that the country should realize their loss." The naval correspondent of the *Morning Post*, who also gives some appreciative words to the character of the late admiral, says that he was at once brusque and genial, immaculately trim, and would have everything with which he had to do as perfect as it could be made. Possessed of private means and unmarried, he was lavish of expenditure and incurably generous. His book, already referred to, and which he said he "fought a single action with a publisher to produce," was written for love of the service for which in the end he gave his life. The regard and sense of loss felt by his numerous friends is perhaps the best monument to his memory.—*Army and Navy Gazette*, 11/28.

LORD FISHER RETURNS TO HIS FORMER POST.—The Secretary of the Admiralty makes the following announcement:

The King has approved the appointment of Admiral of the Fleet Lord Fisher of Kilverstone, G.C.B., O.M., G.C.V.O., LL.D., to be First Sea

Lord of the Admiralty, in succession to Admiral H. S. H. Prince Louis of Battenberg.

Lord Fisher (Sir John Arbuthnot Fisher, 1st Baron), Admiral of the Fleet, is a son of Captain William Fisher, 78th Highlanders. He was born in 1841, and joined the navy on board H. M. S. *Victory* at Portsmouth (which also was his last ship as an admiral) when he was thirteen years of age, on the nomination of Sir William Parker (the last of Nelson's captains), given by him at the request of Lord Nelson's niece.

After fifteen years service he was promoted commander. In the intervening period he served in the Russian war of 1854 in the Baltic and Black seas, and in the China war of 1859-60, being present at the capture of the Canton and Peiho forts and other operations. In 1874 he was made a post-captain, and commanded in succession H. M. ships *Pallas, Valorous, Hercules, Bellerophon, Northampton, Inflexible,* and *Excellent.* During the Egyptian campaign of 1882, he was in command of H. M. S. *Inflexible,* and took part in the bombardment of Alexandria, and was afterwards governor of the city until the arrival of the British troops. In 1887 he was appointed A. D. C. to her late Majesty Queen Victoria. He held the position of Director of Naval Ordnance and Torpedoes from 1886 to 1891. In the latter year Lord Fisher, who had been promoted to rear admiral in 1890, took up his duties as Admiral-Superintendent of Portsmouth Dockyard. The following year he was appointed a Lord of the Admiralty and Controller of the Navy. He was Controller of the Navy for six years.

From 1897 to 1899 he was in command of the North America and West Indies squadron, and from 1899 to 1902 of the Mediterranean fleet, his promotion to full admiral having been gazetted in 1901. Lord Fisher was appointed a Lord of the Admiralty in 1902, but resigned in the following year on his appointment as Commander-in-Chief at Portsmouth. From 1904 to 1910 he was First Sea Lord of the Admiralty, and first and principal naval A. D. C. to King Edward and King George. He retired on January 25, 1911.

He originated the torpedo school of the navy, and was afterwards head of the gunnery establishment of the fleet. In 1875 he acted as president of the commission for revising the "Gunnery Manual," and has served on several other important boards. Amongst others he was a member of the committee to advise as to the creation of a War-office Board in 1903; he is still a member of the Committee of Imperial Defence, and was one of the British representatives at the Peace Conference at the Hague in 1899. His war medals include the Russian war medal, China war medal with two clasps, and Egyptian war medal. As lieutenant he gained the Beaufort Testimonial.

The United Service Magazine, of London, for December, 1914, publishes a monthly article on current events by a British officer under the *nom de plume* of "Admiral," who does not take so rosy a view of the appointment of Lord Fisher as some others do. The writer says: "I cannot close these remarks without a reference to the retirement of Prince Louis, of Battenberg, from his position as First Sea Lord of the Admiralty of which I can only say here, that it is sincerely regretted throughout the service, as he was recognized as an officer of great ability and large experience, fully trusted by all ranks in the navy. He has been succeeded by Lord Fisher, whose ability and power of work are fully recognized; but he is seventy-three and it is twelve years since he held command afloat, while in his six years' tenure of the same position he was thought to have allowed the purely naval necessities, which were his special charge, to be sacrificed to political expediency, notably in the dismantling of foreign yards and the reduction of cruisers."

DIFFERENCES OF OLD-TIME ENGINEERS REMOVED.—The announcement made on Wednesday night that the old-time engineers of the navy are, as

regards their uniform and pay, to have their present differences removed, marks the complete absorption of this branch into the executive ranks of the navy. Henceforward, with the exception of the purple ribbon between the gold stripes on the cuff, there will be little mark of distinction between the officers of the old system of training and those of the new, initiated in 1902.

It may be worth while to recall the conditions which made necessary the great scheme of reorganization, in regard to the entry and training of officers which Lord Fisher designed and brought about. On the introduction of steam into the navy, the engineers were to a large extent drawn from a different source to that which supplied the executive officers. They were educated in a different school, and were largely regarded as a class apart. There was never any question as to the efficiency with which they did their work, and as gradual changes in the types of ships were evolved and engineering became a more important factor in the general effectiveness of the naval machine, so the engineers rose to the occasion. Their responsibility became larger and their duties increased to an extent which had not been contemplated. But with this added importance and increased responsibility there was not a corresponding recognition of their value, nor of the necessity for all officers of the navy to acquire that general scientific knowledge which the transformation of the navy and its equipment had demanded. The fact that there was nothing in common between the early training of the engineers and executives militated against that unity of sentiment which was essential to the welfare of the navy, and difficulties arose therefrom which were fully realized in the service. It was to cope with the changed conditions that Lord Fisher evolved his great scheme of common entry and training. Under the new arrangement, all officers receive a practical instruction in the mechanical details of their profession, and in all that pertains to the science of their calling, while losing none of those influences which went to make them practical seamen and gave them the power of handling men. So designed was this training, that while all executive officers received a valuable education they were also all entered under the same conditions, and without those differences and discriminations which in the past had militated against community of interest and sentiment. Necessarily there was a period to be bridged before the officers of the new order would be fitted to take their places afloat. During that time, and before the engineer of the future was evolved, a great strain was put upon the officers of the old system, to whom in a large measure the success of the changed conditions was bound to be entrusted. The manner in which these officers have loyally given their aid to the successful working of the scheme is beyond praise. Everyone, therefore, must feel that they have fully deserved the concessions now made, which it may be hoped will satisfy them, both as a recognition by those in authority of the way in which they have placed the welfare and efficiency of the service before everything else, and as the removal of any distinction which might have remained between them and their successors.—*Army and Navy Gazette*, 12/26.

REAR ADMIRAL TROUBRIDGE'S ACQUITTAL.—To the people of this country one of the most disappointing episodes in the earlier phases of the war was the escape of the two German warships—the battle-cruiser *Goeben* and the cruiser *Breslau*—that were in the Mediterranean at the time of the outbreak of hostilities. The two vessels are almost brand new ships, and their most useful quality is speed, for while the *Goeben* is capable of attaining 28½ knots, the *Breslau* can steam 27¼ knots an hour. But in gun power they are inferior to the three British battle-cruisers, *Inflexible*, *Indefatigable*, and *Indomitable*, that were also in the Mediterranean at the time war was declared; and when the information reached this country early in August that the *Goeben* and *Breslau* had taken refuge in Messina, and that the British fleet was outside awaiting their exit, it seemed that through a happy combination of circumstances they were literally within our grasp. Their

escape therefore, was a grave disappointment to the people of the allied nations. That there was no popular clamor for an explanation may be attributed to the fact that the people of Great Britain have abounding faith in their navy. Eventually the Admiralty may be expected to lay before the public a full statement showing the circumstances under which the *Goeben* and *Breslau* "dished" our fleet. In the meantime Rear Admiral E. C. T. Troubridge, who commanded the First Cruiser Squadron, will receive hearty congratulations on having demanded a court-martial and on being honorably acquitted after an exhaustive investigation into the charge of failing to pursue the enemy's ships.—*Naval and Military Record*, 11/18.

SIR JOHN JELLICOE'S MESSAGE TO THE WIVES AND FAMILIES OF HIS FLEETMEN.—Lady Jellicoe, presiding at a mass meeting of women in London on Thursday in connection with the "Tipperary" League for providing restrooms for female dependents of the men on active service, read the following letter from Admiral Sir John Jellicoe:

I know you will be meeting the wives and families of the men, and I hope you will tell them of the magnificent spirit which prevails. Our troops have covered themselves with glory during this war. The navy has not yet as a whole had an opportunity of showing that the old spirit which carried us to victory in the past is with us now; but where our men have had an opportunity of fighting the foe above water, they have shown that they possess the same pluck and endurance as our comrades on shore.

Nothing could have been finer than the coolness and courage shown in every case where ships have been sunk by mines and torpedoes. The discipline has been perfect, and men have gone to their death not only most gallantly, but most unselfishly. One hears on all sides of numerous instances of men giving up on these occasions the plank which had supported them to some more feeble comrade. I feel prouder every day that passes that I command such men. During the period of waiting and watching they are cheerful and contented in spite of the great dulness of their lives.

I am sure you will tell the wives and the children and mothers of our men of the spirit that prevails. I am sure that will make them, too, desirous to show in their own lives that they are animated by the same spirit to do the best they can for their country, so that they will be worthy of their mankind, of whom it is difficult to say too much.—*Naval and Military Record*, 11/25.

BUSINESS MEN AND THE FLEET.—It is gratifying to note that the recognition and appreciation felt by the business community for what the navy has done and is doing to keep our trade routes open and the sea communication free from interruption are being publicly expressed by the institutions mainly concerned. Last month the Council of the London Chamber of Commerce unanimously passed a resolution expressing gratitude to the officers and men of the fleet for their efforts to safeguard the interests of the empire in the present crisis. On Monday last the Dublin Chamber of Commerce, at its quarterly meeting, followed this example, and doubtless other chambers throughout the country will do the same, if they have not already done so. Similarly, the Baltic, that house or axis of seaborne property, ships and merchandise, as Mr. Douglas Owen has aptly described it, has also placed on record its gratitude to the navy for what it has done for our floating trade. It was timely that these important and authoritative bodies should have done this, because there are still people in the country who are sceptical as to the accomplishments of our gallant seamen, and who cannot be brought to realize that the navy has, in point of fact, done everything for them. Other achievements in the war may make more noise in the world, and be attended with more dramatic effects, but the work of the fleet should not be neglected because it is done in silence and out of sight. That the principal business men of the realm should have taken the lead in making formal recognition of this work, must be gratifying alike to the government, the navy, and the country.—*Army and Navy Gazette*, 12/12.

FORSAKING THE SEA.—It is not alone that the Yankee sailor has forsaken the sea. The British sailor is doing the same. Scandinavia, miscellaneous Europe and Asiatics are more and more manning the British merchant navy, just as they are manning what few ships we have belonging to this country: and only the officering is now left to English-speaking peoples. This process has become so marked in England that it has become a matter of national concern, says the *Boston Transcript*. What few training ships the English maintain to convert London waifs into British seamen (and from our standard they would not be considered a few) are of little effect on the total number of the men in the merchant ships which keep England fed. There is another force at work which was recognized the other day by the Sanitary Commission at Blackpool; that the conditions of life afloat for the man before the mast were nothing more or less than a slum afloat, and a slum of such vileness that it would not be tolerated a day if it existed on land. The economic pressure in England is sharp, but it is not sharp enough to force such living conditions at sea that that grade of British boys and youths who have the most to give to the strength of a merchant navy is being lost into other occupations ashore. The circumstance which has maintained the conditions as long as this is that the out-of-door nature of seamen's work has counteracted some of the worse influences on their unsanitary living quarters. In this respect, our own vessels are not quite guiltless, and it was in the much needed seamen's bill to improve them.—*Nautical Gazette*, 12/23.

GREECE

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battle Cruisers					
Salamis	19,500	23	8 14-in., 12 6-in., 12 3-in.	Vulkan Works, Stettin	Laid down July, 1912
.....	24,000	21.5	10 14-in.	Saint Nazaire	Reported that negotiations have been completed for this ship.

ITALY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Giulio Cesare ...	22,022	22	13 12-in., 18 4.7-in.	Genoa	Completed
Conte-di-Cavour	22,022	22	13 12-in., 18 4.7-in.	Spezia	"
Leonardo da Vinci	22,022	22	14 14-pdr. same	Genoa (Odero)	"
Andrea Doria...	22,564	23	13 12-in., 16 6-in.	Spezia	Launched March 30, 1913
Duilio.....	22,564	23	same	Castellamare	" April 24, 1913
4 ships	28,000	24	8 15-in., 16 6-in.	....	Will probably be laid down during spring and summer, 1915
Small Cruisers					
Basilicata	2,500	16.5	6 6-in.	Castellamare	Laid down Aug. 9, 1913
Campania	2,500	16.5	6 6-in.	"	" Aug. 9, 1913

NOTE.—Italy has about 15 destroyers and two submarines under construction.

ITALY'S ATTITUDE.—The most interesting political event of the week was the opening of the Italian Parliament, when the Premier, Signor Salandra, made a statement explaining the situation of Italy, defending the correctness of the course so far pursued, and recommending the maintenance of an attitude of loyal, but "watchful, and armed neutrality." A significant demonstration was made by the Extreme Left when Signor Salandra referred to "the just aspirations of Italy," the phrase being taken to apply to Italian ambition for the recovery of Trent and Trieste, and another demonstration occurred when a member, before adjournment, proposed that the chamber send greetings to "heroic and unfortunate Belgium." A vote of confidence in the government was passed on December 5 by 413 to 49, the dissentients having chiefly expressed dissatisfaction with the military preparedness of the country. Replying to criticisms on this score, Signor Salandra declared that the Italian army and navy were "ready for any event."—*The Nation.*

ITALIAN NAVAL CONCENTRATION.—According to a telegraph from Taranto, the number of warships concentrated in that port is now 120. The fleet exercises daily, and special interest attaches to the maneuvers of the submarines, which make long runs outside the Gulf against the larger vessels.

SHELL ACCIDENT ON "SAN MARCO."—A few days ago a serious accident occurred on board the battleship *San Marco.* A shell burst and killed four men, and fragments fell on board the battleship *San Giorgio,* nearly a mile away, killing one of her crew.—*Naval and Military Record,* 11/25.

JAPAN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Fuso.....	31,300	22.5	12 14-in., 16 6-in.	Kure	Launched Mar. 28, 1914
Fuso 2d.....	31,300	22.5	....	Kawasaki	Date when these ships will be laid down has not yet been settled.
Fuso 3d.....	31,300	22.5	....	Mitsubishi	
Fuso 4th.....	31,300	22.5	....	Yokosuka	Laid down Nov. 20, 1913
Battle Cruisers					
Hiyei.....	27,500	27	8 14-in., 16 6-in., 8 t. t.	Yokosuka	Commiss'd Mar. 31, 1914
Haruna.....	27,500	27	same	Nagasaki	Launched Dec. 14, 1913
Kirishima.....	27,500	27	same	Kobe	" Nov. 30, 1913

NOTE.—Japan has two destroyers and two submarines under construction in England and France respectively.

NEW DESTROYERS.—Two ocean-going destroyers equipped with Diesel engines are now building at Messrs. Yarrow & Co.'s yard, Scottstoun, Glasgow, for the Japanese Navy. They are about 260 feet in length and 27.3 foot beam, and while the main propelling machinery in each ship consists of two 12,000 h. p. steam turbines, driving twin screws, each vessel has also in addition two 600 b. h. p. Diesel installations for cruising purposes. The Diesel engines drive the same propellers as the main machinery, the arrangement being, it is reported, to have a solid shaft working inside a tubular shaft. The Diesels are of the 6-cylinder, 4-cycle type, built, it is said, by Burmeister and Wain, of Glasgow. Under full power the vessels should be able to keep up a speed of round 34 knots, while under cruising machinery alone a speed of 13 or 14 knots should be attained. The cruising Diesels will not be used when the vessels are under full power. These Japanese craft, which are named the *Kawakaze*

and *Urakaze*, are bound to attract some attention, as they are the first destroyers in which Diesel engines have been installed. To build Diesel engines capable of giving a speed of 14 knots does not mean taking much experimental risk. Diesels of much higher power than would be necessary have been built, and at the moment are doing good service as the main propelling machinery in ocean-going vessels. The Diesel cruising machinery in torpedo-boat destroyers is, of course, of the light high-speed type. Some years ago the British Admiralty had serious thoughts of experimenting in the way of installing Diesel machinery as full-power in an old second-class cruiser, the idea being to replace one of the vessel's steam sets (she was a twin-screw craft with a big 6-cylinder Diesel), and thereby obtain valuable data by running two classes of machinery side by side. The project, however, fell through, and it is scarcely likely that Diesel engines will be fitted as a prime mover in light cruisers in the near future. —*Shipping Illustrated*, 12/26.

NORWAY

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Small Cruisers					
Bjorgvin	5000	16.5	2 9.4 in., 4 6-in., 6 4-in.	Messrs. Armstrong	Laid down Jan. 8, 1913
Nidaros	5000	16.5	same	same	Launched June 9, 1914

NOTE.—Norway has four submarines under construction. (Vessels building in England have been taken over as a war measure.)

RUSSIA

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Sevastopol	23,026	23	12 12-in., 16 4.7-in.	Baltic Works	Launched June 29, 1911
Petropavlovsk.	23,026	23	same	" "	" Sept. 9, 1911
Poltava	23,026	23	same	New Admiralty	" July 10, 1911
Gangut	23,026	23	same	" "	" Oct. 7, 1911
Emperor Alexander III	22,435	21	12 12-in., 20 4.7-in.	Nikolaieff	" Apr., 1914
Empress Marie	22,435	21	same	Ivan Bunge Co.	" Nov. 3, 1913
Catherine II...	22,435	21	same	" " "	Laid down Sept. 1, 1912
Battle Cruisers					
Ismailia.....	32,200	28	12 14-in., 21 5.1-in.	Galerni	" Dec. 19, 1912
Kinburn.....	32,200	28	same	Baltic Works	same
Borodino.....	32,200	28	same	Galerni	same
Navarino.....	32,200	28	same	Baltic Works	same
Small Cruisers					
Adm. Butakow	7,500	32	15 5.1-in.	Putilow, St. Petersb.	Laid down Nov. 29, 1913
Adm. Spiridov.	7,500	32	same	" "	" Nov. 29, 1913
Svietlana.....	7,500	32	same	Neval	" Dec. 7, 1913
Adm. Grieg....	7,500	32	same	"	" Dec. 7, 1913
Muravjev Amurski	4,500	..	8 5.1-in.	Elbing	Launched Apr. 11, 1914
Adm. Nevelskoj	4,500	..	same	"	Laid down Feb. 13, 1913
" Lazarev...	7,500	32	15 5.1-in.	N. F. & W. Nikolaieff	" Oct. 19, 1913
" Nachimow	7,500	32	.....	R. S. Co. "	same

NOTE.—Russia has about 45 destroyers and 19 submarines under construction or contract.

SPAIN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Battleships					
Espana.....	15,450	19.5	8 12-in., 20 4-in.	Ferrol	Commiss'd Oct. 23, 1913
Alfonso XIII..	15,450	19.5	same	"	Launched May 7, 1913
Jaime I.....	15,450	19.5	same	"	Laid down Feb. 5, 1912

On the 6th of November the following naval program was introduced before the Spanish Chamber, providing for a total expenditure of 260,600,000 pesetas (£9,772,500) : four fast cruisers (£2,250,000) ; six destroyers (£1,125,000) ; twenty-eight submarines, together with salvage and repairing material (£4,125,000) ; three gunboats (£337,500) ; eighteen coastguard mine-layers (£225,000) ; mines and other submarine defences (£337,500) ; aerial material, including experiments (£225,000) ; works at Ferrol, £146,250; works at Cadiz, £337,750; works at Cartagena, £238,125; harbors for torpedo craft and submarines, £75,000; and other minor matters such as tugs, pontoons, lighters, etc., amounting to £347,800.—*United Service Magazine.*

SWEDEN

VESSELS BUILDING

Name	Displacement	Speed	Armament	Builders	Remarks
Small Cruiser					
Sverige.....	7100	22.5	4 11-in., 8 5.4-in.	Gothenburg	Laid down Feb. 15, 1913

UNITED STATES

BIDS FOR TORPEDO-BOAT DESTROYERS.—Bids for the construction of the six destroyers, *Nos. 63* to *68,* inclusive, authorized by the last Congress, were opened in the Navy Department November 10, 1914.

These vessels were authorized by Act of Congress, approved June 30, 1914. The limit of cost, exclusive of armament, is $925,000 each. These vessels are the largest destroyers as yet designed for the U. S. Navy and embody certain military characteristics not included in the vessels of the previous class, *Nos. 57* to *62,* for which the limit of cost was $950,000 each.

In general, the dimensions of the vessels of this class are identical with the vessels of the preceding class, with the exception of the draft, which has been increased one and one-half inches, giving a displacement of 1110 as compared with 1090 tons for the previous class. The principal characteristics of these vessels are as follows:

Length over all, 315 feet 3 inches.
Length between perpendiculars, 310 feet
Breadth, molded, extreme, 29 feet 10 inches.
Mean draft, 9 feet 5¾ inches.
Displacement, 1110 tons.
Speed, 29½ knots.
Armament, four 4-inch rapid fire guns; four 6.8 m. x 21 inches triple torpedo tubes; two one-pounder automatic anti-balloon guns.

NAVY DEPARTMENT
BUREAU OF CONSTRUCTION AND REPAIR
VESSELS UNDER CONSTRUCTION, UNITED STATES NAVY, JANUARY 11, 1915

Name, type and no. of vessels	Contractor	Per cent of completion			
		Jan. 1, 1915		Dec. 1, 1914	
		Total	Per cent on ship	Total	Per cent on ship
Battleships					
36 Nevada	Fore River S. B. Co.	82.0	77.8	80.4	75.3
37 Oklahoma	New York S. B. Co.	85.6	84.8	82.3	81.3
38 Pennsylvania	Newport News S. B. Co.	64.6	58.0	61.7	53.2
39 Arizona	New York Navy Yard	45.5	41.3	43.6	35.6
40 California	New York Navy Yard	0.0	0.0	.....	.....
41 Mississippi	Newport News S. B. Co.	4.0	.....	2.0	0.0
42 Idaho	New York S. B. Co.	4.3	0.0	.....	.....
Destroyers					
45 Downes	New York S. B. Co.	95.3	95.3	95.3	95.3
51 O'Brien	Wm. Cramp & Sons	93.1	92.9	91.1	90.3
52 Nicholson	Wm. Cramp & Sons	89.8	89.6	88.9	87.6
53 Winslow	Wm. Cramp & Sons	86.1	83.4	83.7	80.8
55 Cushing	Fore River S. B. Co.	80.2	78.0	76.5	73.7
56 Ericsson	New York S. B. Co.	91.0	91.0	89.5	89.4
57 Tucker	Fore River S. B. Co.	24.0	18.4	21.3	15.4
58 Conyngham	Wm. Cramp & Sons	52.1	49.3	45.9	43.3
59 Porter	Wm. Cramp & Sons	47.6	43.8	41.1	37.8
60 Wadsworth	Bath Iron Works	74.8	73.3	71.7	69.5
61 Jacob Jones	New York S. B. Co.	47.6	46.6	41.8	40.1
62 Wainwright	New York S. B. Co.	46.7	45.7	41.4	39.7
63	Fore River S. B. Corporation	0.0	.....	.....	.....
64	Fore River S. B. Corporation	0.0	.....	.....	.....
65	Bath Iron Works	0.0	.....	.....	.....
66	Bath Iron Works	0.0	.....	.....	.....
67	Wm. Cramp & Sons	0.0	.....	.....	.....
68	Mare Island Navy Yard	0.0	.....	.....	.....
Destroyer Tenders					
2 Melville	New York S. B. Co.	75.8	74.4	73.6	72.0
Submarines					
27 G-2[1]	Lake T. B. Co. (Bridgeport)	89.7	89.7	89.7	89.7
31 G-3[1]	Lake T. B. Co. (Bridgeport)	86.7	86.3	85.7	85.4
40 L-1	Electric Boat Co. (Quincy)	84.5	83.3	74.1	71.0
41 L-2	Electric Boat Co. (Quincy)	80.6	77.8	73.6	70.1
42 L-3	Electric Boat Co. (Quincy)	73.9	70.7	70.6	67.0
43 L-4	Electric Boat Co. (Quincy)	72.7	68.8	69.6	65.7
44 L-5	Lake T. B. Co. (Bridgeport)	54.2	47.9	51.2	44.5
45 L-6	Lake T. B. Co. (Long Beach, Cal.)	51.4	44.9	49.0	43.0
46 L-7	Lake T. B. Co. (Long Beach, Cal.)	50.3	43.6	48.0	42.0
47 M-1	Electric Boat Co. (Quincy)	59.4	53.4	55.7	50.3
48 L-8	Portsmouth, N. H., Navy Yard	2.0	.....	1.0	.....
49 L-9	Electric Boat Co. (Quincy)	39.6	31.3	31.2	25.1
50 L-10	Electric Boat Co. (Quincy)	37.7	28.1	29.3	22.1
51 L-11	Electric Boat Co. (Quincy)	24.4	15.4	16.7	12.4
Submarine Tenders					
2 Bushnell	Seattle Construction & D. D. Co.	79.4	73.6	77.5	72.3
Fuel Ships					
13 Kanawha	Mare Island Navy Yard	90.1	89.5	87.1	86.7
14 Maumee	Mare Island Navy Yard	68.7	68.1	63.8	63.1
Miscellaneous					
Supply Ship No. 1	Boston Navy Yard	14.2	2.0	11.1	.....
Transport No. 1	Phila. Navy Yard	3.2	0.0	2.9	0.0
Pan. Canal Colliers					
Ulysses	Maryland Steel Co.	78.2	74.4	68.0	63.0
Achilles	Maryland Steel Co.	67.6	62.3	50.6	51.9

[1] Contracts forfeited, vessels being completed New York Yard.

The Secretary of the Navy awarded contracts for the six destroyers, *Nos. 63* to *68*, authorized by the last appropriation bill, which limited the amount which might be paid for each to $925,000. The awards were to the Fore River Shipbuilding Co. for two ships at $795,000 each, to the Bath Iron Works for two ships at $800,000 each, and to the Cramp Shipbuilding Co. for one ship at $820,000. The sixth will be constructed at the Mare Island, California, Navy Yard, which submitted an estimate of $626,487. This is the first destroyer to be built in a navy yard.—*The Nautical Gazette, 12/23.*

U. S. SUBMARINES ARE TOTALLY UNFIT, NAVY EXPERTS SAY.—That the submarines now in use by the United States are generally in disrepair and totally unfit for service in time of war is disclosed in a communication submitted to the House Committee on Naval Affairs by authority of Secretary of Navy Daniels.

The data bearing on the submarines were prepared by Captain Albert G. Winterhalter, aid for material in the Navy Department. It was sent to the House Committee as a result of the discussion aroused by the publication of the report of Commander Stirling that few if any submarines of the Atlantic flotilla are fit for war service.

The report by Captain Winterhalter seems to indicate that the United States Navy has made very little progress in the development of the submarine in contrast with the efficiency of this type of vessel now in use in European waters. Included in the report on submarines is a memo prepared in the bureau of construction and repairs. This memo outlines the difficulties that have been encountered with submarines, as follows:

1. Two submarines of the *A* class in 1904 took sudden dives to the bottom due to leaky valves or over-trimming. They were brought to the surface by the crews after some little difficulty.

Gas Filled the "E 2."—2. In the fall of 1914 the *E 2* while running submerged filled with chlorine gas from salt water reaching the batteries. This was found to be due to leaks in the lead lining of the storage battery tanks, through which acid trickled, causing leaks in the ballast tanks. This accident has involved changes in the battery linings, etc., of other submarines.

3. Submarine *C 4* was found to be considerably overweight during building due to fault in design. This was remedied by the contractors before the vessel was brought to trial.

4. Engine foundations and tank tops of submarines *G 1*, *G 2* and *G 3* were found to be structurally weak and had to be re-enforced.

5. Periscopes: Considerable trouble has been experienced in the development of periscopes. Such troubles probably were to be expected and it is believed that they have been overcome.

6. Battery ventilation: Considerable trouble has been experienced with battery ventilation in the older boats, many battery explosions having resulted from improper ventilation. This has involved making considerable changes in the battery ventilation arrangements of all the other submarines.

As submarines depend for their operation upon so much complicated machinery as compared to surface vessels it is natural that a large amount of attention should have been required by these vessels and their auxiliaries. Such items cannot, however, be classed as troubles of the kind in question, as they are simply questions of development and detail and not faults of design or construction.

Troublesome to Navy.—Secretary Daniels testified before the committee that the navy had experienced more difficulty with submarines than with any other class of vessels. He dwelt particularly on the troubles that are occasioned by the present form of storage batteries.

The naval officials have had great trouble with submarines from the steam engineering standpoint, but in general, according to the report, these have been eliminated by renewals, repairs, replacements and alterations, but the necessity of frequent overhauls still exists.—*New York Sun*, 1/5.

OCEAN-GOING SUBMARINE.—Plans have already been perfected, in the U. S., for the building of an ocean-going under-water vessel, which will have a length of 300 feet and a cruising radius of 3500 miles. There is every likelihood that the next Congress will make an appropriation for a second submarine of this type.—Reuter, *Naval and Military Record*, 11/26.

ARGUMENTS AGAINST BIG SUBMARINES.—At present, submarines are foremost in the public eye and nothing apparently will convince the amateur strategist that any naval type outside the submarine has any future ahead of it. The U. S. Navy Department is definitely committed to the building of submarine cruisers able to operate a long distance away from a base and able to accommodate their own crews without the assistance of a tender or "mother ship." However, the disadvantages of the big submarine are as obvious as the dangers of the colossal dirigible. From the character of her work, the underwater boat must always take an infinitely greater risk than any other type of naval unit; and unlike the surface warship, her powers of aggression do not increase with her size. A torpedo remains a torpedo whether it be launched from a pinnace or a battleship. On the other hand, the bigger the submarine the more clumsy her evolutionary capabilities and the greater the prospect of her revealing her whereabouts. A boat with a cruising radius of 3000 miles must be largely in the nature of a surface craft, seeing that her complement is bound to be increased in the ratio of her size, although she cannot remain proportionately longer submerged.—*Shipping Illustrated*, 12/25.

NEW REVENUE CUTTERS.—Two revenue cutters, one to cost $350,000, for Pacific waters, and the other to cost $110,000, for anchorage patrol and ice-breaking in New York Harbor, were authorized December 14 in a bill favorably reported by the House Commerce Commission.—*Shipping Illustrated*, 12/19.

NEW UNITED STATES NAVAL DRYDOCK.—The Union Iron Works, San Francisco, is under contract with the Navy Department to build a drydock 1096 feet long by 110 feet wide with 40 feet depth over the sill, which is to be used by United States naval vessels in the Pacific. The department has guaranteed the builders a sufficient amount of business to bring a return of $50,000 a year for six years.—*Scientific American*, 12/12.

CHIEF CONSTRUCTOR D. W. TAYLOR, U. S. N.—*Head of the Bureau of Construction and Repair of the Navy.*—The recent appointment of Naval Constructor David Watson Taylor to the direction of the Bureau of Construction and Repair at the Navy Department, is one of the most popular made in the U. S. naval service in recent years. There is not probably within the line and staff of the U. S. Navy another officer whose achievements are as well known throughout the world as those of Rear Admiral Taylor—for the post which he now occupies carries with it the relative rank of Rear Admiral. Born in Louisa County, Va., March 4, 1864, Naval Constructor Taylor was appointed to the Naval Academy in 1881 and graduated in 1885 at the head of a class, noted for the number of brilliant scholars it contained. The multiple he achieved at the Naval Academy is the highest upon record at that institution, it having never been equalled either before or since his time. After a few months at sea following his graduation in 1885 he was ordered to England to take up the study of naval construction at the Royal Naval College, Greenwich. His achievement at this institution in competition with picked men from all parts of the world paralleled his unequalled record at the U. S. Naval Academy. After graduating from Greenwich in 1888, he returned to this country and was for a while attached to the Bureau of Construction and Repair, Navy Department, and was later sent to the navy yard at Mare Island, California, where he took an active part in important shipbuilding operations. In May, 1894, he returned to the Bureau

of Construction and Repair as an assistant to the Chief Constructor, and he has been stationed at the national capital ever since. On March 4, 1901, he attained the relative rank of captain, which he held at the time of his appointment as Bureau Chief. Speaking generally, it may be said that Chief Constructor Taylor is responsible for the immense strides in ship design made by the U. S. Navy during the past decade, until it has achieved a leading position among all navies of the world in the matter of hull design. For a number of years he has been in charge of the model basin at the Washington Navy Yard and his researches have led to such important discoveries in the influence of form on the speed of ships, that the designs based on his experiments have resulted in a saving of many millions to the nation, in the shape of greater efficiency obtained from scientifically-determined dimensions. Not only have Taylor's researches had an immense influence on the design of warships, but the experience obtained in warship construction has exercised a most profound influence on marine architecture for commercial purposes, and for the great saving in the powering of ships made possible in recent years by the improvement in hull design, shipowners must primarily thank the able new chief constructor of the navy. In most departments of applied science, the formulæ worked out by investigators are seldom taken full advantage of during the life of their discoverer. The average mind seldom rises to a sufficient comprehension of the possibilities of an abstract discovery fully to grasp the material advantages to be obtained by its application. This phase of evolution in scientific progress is generally reserved to the successors of the pioneer, those whom the Greeks designated as "afterborn" (*epigonoi*). In the career of D. W. Taylor, however, we find that as soon as he began his investigations into the problem of resistance as applied to ship forms his deductions were at once accepted by the profession to which they were communicated in the form of papers read at meetings of the Institution of Naval Architects in London and the Society of the Naval Architects and Marine Engineers in New York. His investigations have included practically every phase of marine propulsion and the net result of his labors has been the complete elimination of empirical methods in ship design, so that vessels designed on the basis of Taylor's deductions have practically equalled the speed of vessels of ten years previous on the same horse-power, notwithstanding that the later vessels had nearly double the displacement of their forerunners. In terms of mercantile practice, this means that a 9000-ton cargo boat could be built with only the power necessary to drive an old 5000-ton boat at the same speed. In other words, the shipowner sufficiently clear-sighted to retain the services of a naval architect conversant with the latest scientific developments in his profession, could obtain increased capacity *for nothing*, provided the dimensions of the larger boat were scientifically determined. Chief Constructor Taylor's paper on "Ship-Shaped Stream Forms," contributed in 1894 to the proceedings of the (British) Institution of Naval Architects won him the Gold Medal awarded to the best original paper. This was the first time such a distinction had been conferred upon an American. His first book was published in 1893, being entitled "Resistance of Ships and Screw Propulsion," which now ranks as a classic. Six years later Chief Constructor Taylor gave to the world his second book, "Speed and Power of Ships," which is looked upon to-day, at home and abroad, as the leading authority on the subject. The novel method of treatment of the topics covered by his first book received the flattering indorsement of adoption by substantially all subsequent investigators in that field, especially the Germans. The first experimental tank was erected in America in 1899 under the direction of Chief Constructor Taylor, and he has been in charge of it ever since, determining the form and dimensions of every ship built for the U. S. Navy. Our professional readers know to what lengths he has gone in leaving nothing to guesswork or empiricism in the design of ships and many a detail which may appear insignificant to the untrained observer is incorporated in the design for scientific reasons based on the experiments

at the Washington Model Basin. The world-wide fame enjoyed by the new chief constructor led the British Admiralty a few years ago to obtain his services as an expert witness at the trial of the *Olympic-Hawke* collision case. His lucid evidence on the theory of suction between passing vessels swayed the court in favor of the Admiralty and the legal doctrine based on this evidence has since become part of the maxims assisting in the determination of responsibility in collision cases by British courts.—*Shipping Illustrated*, 12/26.

COMMISSIONED CHIEFS.—On January 7 the committee granted a hearing to Chief Gunner B. P. Donnelly, who advocated the incorporation in the bill of an amendment which would establish the rank of commissioned chief. The following is the text:

Provided, that chief boatswains, chief gunners, chief machinists, chief carpenters and chief pharmacists shall be termed commissioned chiefs. Provided, that the commissioned chiefs shall after six years from date of commission be recommissioned with the rank of lieutenant, junior grade, and six years from date of commission as chief, with rank of lieutenant, junior grade, be recommissioned as chief, with the rank of lieutenant, in the naval service.

Provided, That the commissioned chiefs shall receive the pay and allowances, including longevity pay, heat, light and quarters allowances as are now allowed or may in the future be allowed officers of equal rank to that of the commissioned chief in the line of the navy.

Provided, That warrant officers shall receive the same heat and light allowances as are now allowed or may in the future be allowed an ensign in the line of the navy, this to be in addition to the pay and allowances already allowed by law.

Provided, That immediately on the passage of this act commissioned chiefs shall be recommissioned in accordance with the provisions of this act; and thereafter all warrant officers and commissioned chiefs in the naval service shall be examined for promotion by a board of commissioned chiefs.

Chief Gunner Donnelly in support of the amendment gave a number of reasons for its adoption. The "chief" officers, he said, are the practical officers of the naval service. Some have been in the same grade for as much as twenty years. They are specialists in their line, and as such should be given credit for their work. They should be in a position to prevent damage on the part of the younger line officers.

At present, he added, at the end of four years in the service, the youngest inexperienced line officer takes precedence over the oldest chief warrant officer (commissioned chief). Dentists in the service outrank them all. With these officers as executives in torpedo-boats and submarines he believed that there would be no such condition as shown by Commander Yates Stirling in his hearing before the Naval Committee, "for the reasons that the gunners are specialists in ordnance, electricity, or torpedoes, or all; the machinists are engineers in fact in the service, the carpenters are practical men in the construction department, and the pharmacists so termed are actually the superintendents and quartermasters in the hospitals."

"The enlisted men," he added, "would have a greater incentive to remain with a hope to reach these grades. In this manner you would provide the needed extra officers in the service, as has already been done in the British navy. These officers can and should fill all deck officers' positions on fuel ships and auxiliaries, as well as being in the engine rooms and in command. Also fill the positions as officers in charge of vessels in reserve. (This work they already perform with a line officer nominally in charge.) Because by putting them in charge of vessels in reserve you would release a number of line officers for actual service. Because they are the logical men on reaching the higher grade to act as executive officers of naval reserve units, 1/9."—*Army and Navy Journal*, 1/9.

NAVAL MILITIA.—In line with the principle of placing the naval militia more completely under the control of the Navy Department, the system of examinations adopted by the Naval Militia Board and a board appointed by the Secretary of the Navy, will mean that the holder of a commission in the naval militia is qualified to serve in the regular navy in case of war. Under this system, naval militia officers will become reserve officers for the regular navy. Between now and February 19, 1917, all officers in the naval militia will have a chance to study, under officers of the navy detailed as inspector-instructors with the militia, for an examination which they must pass in order to hold or receive their commissions. Details of a scheme of examination for promotion have not been worked out, but this matter will be attended to promptly. Warrant officers and enlisted men are to be encouraged to study for examination for commissions, though the exact method of examination and promotion remains to be considered. Naval militia officers generally are enthusiastic about the plan, and realize that it will make the naval militia a valuable force in time of war.—*Army and Navy News,* Jan.

THE UNITED STATES AND WAR.—War is, unfortunately, nearly as catching as measles, and this statement just now requires no proof. The fact has recently come home to the minds of the people of the United States, who with much to lose and nothing to gain by embarking on war, find themselves more or less involved in trouble with Turkey, and even more put to it to steer clear of war with Mexico. The situation with regard to China and Japan is also uneasy, and taking one consideration with another, it can cause no surprise that the acknowledged weakness of the United States military organization is regarded with a certain amount of anxiety. The situation of the States is indeed not altogether unlike our own, and the additional security afforded by their geographical position, though a strong factor, is no longer the shield that it was. Like Great Britain, the States have a strong navy and strong ideas of foreign policy, backed up by a weak army. The only difference is that their foreign policy is much more defiant than ours has been for the last sixty years or more, while their army is infinitely weaker. All these considerations, and many more, are now being urged in the American press, and the upshot will be looked for with interest in this country. The futility of imagining that a nation can avoid war by preferring peace, any more than a man can avoid quarrels by staying indoors, has recently been expressed in vigorous words by an American writer in the following phrase: "Be good, yes; treat men fairly, to be sure; be honorable, just, upright, and fair dealing. But until you have made over the nature of man, be prepared to defend that which is yours with a right hand strong enough to give a knockout punch if you are compelled to fight. That is good logic and unadulterated common sense, as I believe.—*Army and Navy Gazette,* 11/28.

FROM SENATOR MILES POINDEXTER, PROGRESSIVE, OF WASHINGTON.—Settlement of the European war will bring United States face to face with the victor of that war, whether Germany or England, in settlement of interests of that victor in all American questions. That victor will be fully armed, equipped and prepared. The Mexican question is as far from permanent settlement as ever. The United States is looked to by European nations having great interests there to settle it. Under our claims that European nations must not occupy or colonize the Americas we must assume responsibility to bring an end to the condition of anarchy and afford redress for destruction of lives and property of peaceful and non-combatant foreigners there; or else abandon the position assumed by Cleveland in the Venezuela affair as well as the case of Maximilian. Necessity of expansion and increased opportunity of trade and settlement are the fundamental causes of the present European war. That necessity will be asserted in the direction of America with power and ruthlessness on the conclusion of the

war by the victorious mistress of Europe. To meet these issues and deal with them with dignity and self-respect without truckling or yielding our traditional policy, the Monroe Doctrine, and accepting European arbitrament of American affairs, a great navy is essential. It should be rapidly increased and a separate fleet built for each station in the Pacific, where great issues also confront us. Undoubtedly this will be one of the chief issues in the presidential campaign of 1916.—*N. Y. Herald*, 11/16.

MR. ROOT'S OBJECTIONS TO SHIP PURCHASE BILL.—Senator Root showed great feeling in his speech, which seemed to make a serious impression on the Senate. He said:

"I have known of no measure laid before the Senate in the past half dozen years which seemed to me weighted with such consequence as is this bill. There are three major subjects—lines of consideration—upon each one of which we must regard this bill as of very great consequence to the people of the country.

"The first and least is that it proposes to embark the Government of the United States at very large expense in a business venture of a kind in which the private enterprise of the United States has uniformly met with loss rather than profit, and it proposes to embark the government in such a venture practically without limit imposed by the Congress of the United States. I say that is the least of the reasons why this bill must be regarded as of very great importance.

"A second and more important reason is that it proposes to put the Government of the United States into foreign trade at a time when that trade necessarily involves frequent, almost constant questions of critical importance, of great delicacy and difficulty, arising under the law of nations regarding neutral and belligerent rights. It proposes to put the Government of the United States in a position where her good faith will be questioned, where her violation of the law of nations will be asserted if any situations arise such as have been detailed to us within a few days by the Senator from Montana, Mr. Walsh. It proposes to create a condition where it will be no mere question of an individual citizen of the United States undertaking and succeeding or failing in carrying contraband to a belligerent, but where the same state of facts will raise the question of the United States violating its neutrality and taking sides with one belligerent or another. That is the second reason.

Reversal of Policy.—"The third is that this bill proposes a reversal of the policy which has been followed by this government from the beginning. It proposes to embark the Government of the United States in a business far more extreme than would be the ownership of railroads, far more extreme as an exercise of governmental authority than would be the ownership of telegraph and telephone lines. It proposes to put the Government of the United States in a position where it will step in and remedy the defects, the shortcomings, the failures of individual enterprise by raising money by taxation from all the people in order to carry on the business that individual enterprise has not carried on; and that, sir, means a complete reversal of the policy of the United States.

"It means a new departure on a line of government action more important, more fateful in its results than any act which has ever been passed by this Congress since I, since you, Mr. President, became a member of this body. It means a repudiation more signal than has ever yet been made of the principles of the great leader of the party which 'has the votes' to put this bill through.

"Sir, there has been no discussion here since I have been in this body so imperative in its demands upon the members of the Senate as the discussion of this bill. There has been no measure going so deep to the basis of our institutions as this bill. It comes here, sir, under circumstances which are repugnant.

"There was no hearing before the committee of the House on such a measure as we have before us. There was no hearing before the committee of the Senate. The demand for a hearing was refused and the bill was reported speedily, peremptorily, with but slight opportunity for discussion."

Mr. Lodge's Address.—Senator Lodge, who with Mr. Root is regarded as the best authority in the Senate on foreign relations and international law, showed that he also fears this proposed legislation will involve the United States in serious complications with other nations.—*New York Sun*, 1/5.

THE TRUTH ABOUT THE NAVY FROM ADMIRAL FISKE.—The thanks of the country are due to Rear Admiral Bradley A. Fiske for telling it, through the medium of the House Committee on Naval Affairs, that the United States has only one mine-laying ship with a very limited capacity; that from want of practice the gunnery of the fleet has fallen off until it is inferior to that of at least one other sea power; that the personnel is not sufficiently drilled; that as there is no general staff, although the British, German, Japanese, French, Russian, Austrian and even the Argentine navies have such an organization, the United States would go to war in a haphazard way; that "we have no plan of battle approach and we have no plan of torpedo attack"; that in mine sweepers as well as mine layers, in aeronautical equipment, submarines and "all the auxiliaries" we are deplorably deficient; that having no naval reserve worth the name we could not properly man our ships for hostilities, and that five years of methodical preparation would be required to "bring our navy up to the standard of efficiency of one of the great European navies."

When a high officer of the navy, testifying before a committee of Congress, enumerates so many deficiencies of the service and affirms that the navy is not fit for the supreme test of war, the people will naturally want to know what his qualifications to sit in judgment are. Admiral Fiske has as fine a seagoing and fighting record as any officer in the navy. He is no closet doctrinaire, no pen and ink strategist. He served on the *Yorktown* at Valparaiso in the critical times following the Baltimore incident: he was at Rio de Janeiro in 1894 when the fleet cleared for action to enforce neutral rights; Admiral Dewey commended him for "heroic conduct" at the battle of Manila; he took part in the bombardments of Paranaque, Malabon and San Fernando during the Philippine insurrection; he has been commander of the *Minneapolis, Arkansas* and *Tennessee*, and of a division of the Atlantic fleet. The country is indebted to him for a long list of inventions that have incalculably improved the navigating and battle efficiency of the navy. He has been a member of the General Board. He has won several gold medals for prize essays on naval subjects. There is no more accomplished, practical and responsible officer in the service than Rear Admiral Bradley A. Fiske, who from a sense of duty has turned a searchlight upon the deficiencies of the navy.—*N. Y. Sun*, 12/19.

LACK OF NAVY CO-ORDINATION.—Of interest in connection with the question of a Navy General Staff is a letter from Rear Admiral Austin M. Knight, U. S. N., to the Secretary of the Navy, dated at Newport on December 16, and embodied in the printed testimony given before the House Naval Committee by Secretary Daniels, which was made public this week.

Admiral Knight, who is the head of the Naval War College at Newport, says that an utter lack of proper co-ordination of the fighting units in the navy "has characterized our naval policy, or rather our complete lack of naval policy, since 1863."

His testimony that there was no agency in the Navy Department responsible for keeping the strategists of the service in touch with the fleet, coupled with Rear Admiral Fiske's evidence along the same line, evidently

had a good deal to do with the action of the sub-committee of the House Naval Committee in recommending that Congress create a bureau of operations.

The admiral was asked by Mr. Daniels to give his views on the subject of co-ordination between the fleet and the Navy Department, and began his letter by describing co-ordination as "that unity of purpose and of effort which shall insure the concentration upon battle efficiency of all parts of the fleet itself and of all agencies outside of the fleet which bear or can be made to bear upon battle efficiency." He continued:

"It is often said that naval officers themselves do not know what they want, but for many years past the General Board has spoken in no uncertain terms, and its reports are available for any one who seeks information as to expert naval opinion on an adequate navy for peace and war."

Admiral Knight declared further that the War College regarded lack of co-ordination between the fleet and the department as unfortunate, particularly at this time, "when perfect co-ordination is especially to be desired." He recommended the establishment of a council of national defense which would co-ordinate the various fighting agencies of the army as well as the navy. Concluding his letter he said:

"The remedy for this condition (lack of co-ordination in the navy) rests partly with the fleet, where it is believed that everything that can be done is already in preparation; partly with the department, where it is understood that plans have been already formulated for more extensive maneuvers than have been ever before attempted by our fleet, and partly—and chiefly—with Congress, which alone has power to correct the imperfections in the composition of the fleet which make co-ordination difficult and where there is already pending a bill for a council of national defense, which more than all other agencies combined would make for a co-ordination of all the agencies of the government, many of which lie far outside the field of the navy and the Navy Department."—*Army and Navy Journal*, 1/9.

NAVAL APPROPRIATION BILL.—*Chief of Naval Operations.*—An amendment providing for the establishment of a chief of naval operations and 15 assistants has been attached to the Naval Appropriation Bill by the House Committee on Naval Affairs. The new officers will, in the language of the amendment, be responsible for the readiness of the navy for war. The following is the text:

There shall be a chief of naval operations who shall be an officer on the active list of the navy not below the grade of rear admiral, appointed for a term of four years by the President, by and with the advice and consent of the Senate, who under the Secretary of the Navy shall be responsible for the readiness of the navy for war and be charged with its general direction. All orders issued by the chief of naval operations in performing the duties assigned to him shall be performed under the authority of the Secretary of the Navy, and his orders shall be considered as emanating from the Secretary of the Navy and shall have full force and effect as such. To assist the chief of naval operations in preparing general and detailed plans of war there shall be assigned for this exclusive duty not less than 15 officers of and above the rank of lieutenant commander of the navy or major of the marine corps.—*Army and Navy Journal*, 1/9.

NAVAL VESSEL CONSTRUCTION UNDER WAY.—The annual report of Chief Constructor Watt of the navy calls attention to the fact that there is at present a greater volume of new shipbuilding work being done in navy yards of the United States than ever before in the history of the new navy. Also that advantage is being taken in adapting our naval program to the advanced lines of construction being demonstrated by the events of the war in Europe. There are now under construction 13 submarines of the latest

type, including all the best features of the German submarines that have given such satisfactory evidence of their efficiency, and we also have six super-dreadnoughts building, three of which will have triple-plated bottoms, on the order of the greater number of German battleships of the first line. This feature secures more effective protection from torpedo attacks. Attention is also called in the report to the use of a wind-tunnel in connection with the model tank employed by Naval Constructor David W. Taylor to develop the best form of hull lines. This wind-tunnel is being used with an air velocity of 6000 feet per minute, to carry on experiments with models of aeroplanes and completed aeroplanes. Valuable results are looked for therefrom in the development of aircraft.—*Marine Journal*, 12/26.

ARRIVAL OF THE MOTOR BATTLESHIP.—War goes on its vigorous and headlong pace, but science does not stay her progressive course, and amid the roar and thunder of the guns and the clashing of death-dealing steel, the long awaited motor battleship has been born. She has been placed on the stocks and brought into being in an American shipyard, where so many other novel marine craft and instruments have, at one time and another, been cradled and nursed to maturity. Whether or no she has been born too late to live long as a prime sea fighting machine, remains to be seen. That she will have a medium, if not a long, career appears to be certain, for even if Sir Percy Scott should prove to be right and the submarine drive the battleship and the battle-cruiser from the sea, there must still be a considerable period of transition while the underwater craft displaces the surface craft, and it is during this period of transition that the motor battleship may put in a very useful spell of surface duty as both a first-line and top-line craft. But the question of the superiority of surface and underwater fighting is far from settled in favor of the latter at the moment. The submarine is getting her maximum of chance on the German side and in the first part of this war, and nothing has been accomplished that can be accepted as settling the important question Sir Percy Scott raised. Later on, the British battleship will probably get her full chance and then we shall be better able to judge.—*United Service Gazette*, 11/26.

AMERICAN BATTLESHIP DESIGN.—In an article in London *Navy* on our *California* type of vessels Mr. Maurice Prendergast draws attention to the remarkable standard of excellence displayed by American battleship design during the last ten years. He commends the *California* class for their neat boat stowage, with other external features, and draws special attention to the uncompromising policy in regard to armor. If armor cannot withstand the attack of heavy ordnance, it should be abandoned and the weight used otherwise. This he takes to be the American view by the adoption of the 14-inch plates on the belt and 18-inch on the heavy gun positions, with 16-inch on the conning tower, while the 5-inch guns have no other protection than that afforded by the hull plating, the designers having abjured the use of this armor for the reason already given. Turning to submarines, he holds that we are not making the mistake of developing one arm at the expense of the other if it be true, as Mr. Prendergast hears reported, that our Navy Department has completed a design for a submarine to be the largest in existence, with a cruising radius of 3500 miles and a speed of 21 knots, able to accompany a battle fleet.—*Army and Navy Journal*, 12/20.

RADIO

The value of the wireless in time of war having been so conclusively proven in the present European war, more than customary interest is being taken in the completion by the Navy Department of its chain of powerful wireless stations. The second largest of these stations in the United States, located on the grounds of the Naval Hospital at Chelsea, Mass., is now

practically completed. The station is equipped with two 300-foot triangular steel towers, 600 feet apart at the base. These towers, each of which requires 100,000 pounds of steel, are supported on concrete bases eight and one-half feet square and ten feet deep. The electrical equipment is to be installed by the government, and will be housed in one of the buildings formerly belonging to the old naval magazine. This station will be able to communicate directly at all times with Arlington and other stations in the United States and foreign possessions. It will form one important link in the chain of American wireless stations which are designed to circle the globe and keep Washington constantly in touch with our military and naval forces everywhere.—*Army and Navy News*, January.

WIRELESS GUIDED BOAT SUCCESSFULLY TESTED.—The radio-controlled torpedo-boat invented by John Hays Hammond, Jr., which was tested at Gloucester, Mass., last week, by a special commission consisting of Colonel R. P. Davis, Captain F. J. Behr and Lieutenant S. M. Decker, responded with perfect success to wireless waves when as much as 28 miles distant from the sending station, and it is expected that a very favorable report will result. While the investigation of this system was made primarily to determine whether it could be used in conjunction with the harbor defences of the United States, there is good reason for looking forward to its successful application to the conditions of conflict between opposing fleets at sea. Mr. Hammond's invention is said to be far in advance of anything along this line in Europe, and he has also added an important improvement in the form of a device for preventing interference with his control. He seems, in fact, to have worked out the details of radio control in advance of all other inventors. In effect, the Hammond craft is a huge torpedo, which is directed from the wireless station by Hertzian waves. A load of explosives totaling 4000 pounds can be carried by this novel weapon of naval attack.—*Marine Journal*, 12/12.

WIRELESS TELEPHONY.—Wireless telephony has shown progress this year. Messages were exchanged between Berlin and Vienna, a distance of three hundred miles. A portable wireless receiving outfit mounted on an automobile received spoken messages from the Eiffel Tower at a distance of 60 miles.—*Scientific American*, 1/2.

FURTHER WIRELESS DEVELOPMENT.—A portable wireless telegraph apparatus, invented by an Italian priest, and said to be capable of receiving messages from high power stations over a distance of 1250 miles, was recently successfully demonstrated in Rome, Italy. A simple switch attached by an ordinary domestic electro-cord to his pocket apparatus was what the inventor used for interrupting wireless communications transmitted by the London Foreign Office to the British Embassy in Rome. Messages from Paris and from war vessels at sea were also picked up.—*Marine Journal*, 11/21.

ORDNANCE AND GUNNERY

NEW GUNS FOR PANAMA.—A new type of 4.7-inch howitzer, of wire-wrapped construction, has been developed for use in the Panama Canal defences. It has unusually great power, firing a 60-pound projectile, with a muzzle velocity of 1300 feet a second, and a maximum range of 10,000 yards. Some of the newly completed and tested 14-inch guns are to be installed in the defences of the Canal, and others in the defences of Manila Bay. These guns, firing a 1660-pound projectile, have a muzzle velocity of 2250 feet a second, and a maximum range of about 18,000 yards. The theoretical pene-

tration in the best quality armor is 20.5 inches at the muzzle and 11.2 inches at 15,000 yards. Twenty-three 12-inch mortars of the latest design, having a maximum range of slightly more than 11 miles, were issued to the Panama Canal fortifications last year.—*Army and Navy News,* January.

THE GERMAN 42-CM. GUN.—Much interest has been taken in the 42-cm. (17-inch) German howitzer, but information on the subject has all been rather vague and uncertain. Now, however, our technical contemporary, the *Engineer,* which has published several instructive articles on German war material during the last few months, actually gives a drawing of the famous weapon. It appears that it cannot, like the smaller German and Austrian howitzers, be moved along ordinary roads, but is permanently mounted on a special railway truck which travels on standard gauge lines. The *Engineer* still doubts that the 42 cm. has been used much, and its doubts are justified if the drawing it gives, which is based on particulars afforded to a French paper by a traveller who had seen one of the weapons at Cologne, may be accepted as correct. This description runs as follows: The gun is permanently mounted on a kind of gondola truck, 18 m. (59 feet) long over buffers, which is carried on two bogies, so that it may take curves of small radius. The carriage is borne by a live roller ring rather over 9 feet in diameter, and is rotated by hydraulic power; elevation is effected by the same means. When the gun is brought into action the whole weight is carried on hydraulic jacks under the central portion of the truck, thus relieving the bogies of all load. Firing is effected electrically from a distance. The shell, which is said to be nearly 5 feet long, is charged with picric acid, and a range of 14 km. (nearly nine miles) is attained at 45° elevation. A small revolving crane picks the projectiles out of the ammunition wagon, and puts them on to the loading tray. What means are used for ramming the shell home we do not know. The whole siege train is a very big affair. Besides the gun truck itself, there is a locomotive and tender, an ammunition wagon, a carriage for the gun crew, and a wagon containing a petrol engine driving the various auxiliaries—hydraulic pumps, a dynamo, and so on. The gun and its wagon must weigh between 100 and 110 tons, and the whole train not less than 300 tons. It is probable that the shells are comparatively thin, and contain an abnormally high proportion of explosive, but they cannot weigh much less than three-quarters of a ton each. The transport of projectiles of such weight and size can be no easy matter, and it is not probable that many rounds can be fired per day; indeed, it is obvious from the method of handling the gun that fire must always be slow. Considering all the pros and cons for such an enormous piece, we think it must be conceded that a smaller and more manageable weapon, say, 11-inch or 12-inch diameter, has distinct advantages. The Austrian 28-cm. gun, for example, with its 340 kilos. (750-pound) projectile, and transportable along ordinary good highways, is a far more generally useful weapon. Indeed, the occasions when the "forty-two" could be used profitably, or used at all, would appear to be few and far between. The overthrow of permanent bridges is sufficient to destroy its mobility, whilst the destruction of railways within the neighborhood of places it is likely to attack render it useless till they have been restored or new ways built. When we remember how exceedingly important transport is in war we may entertain doubts that it is wise to devote no less than 300 tons to a single weapon; such a piece, at least, would have to be enormously effective to justify so heavy a tax upon transport facilities, and we are disposed to anticipate that it would be used rather for defensive than for offensive purposes.—*Army and Navy Gazette,* 11/5.

KRUPP GUNS FOR SUBMARINES.—The guns carried on modern submarines are of two classes: those which remain on deck when the boat dives, and those which disappear into the superstructure. The former are necessarily small pieces, as if of large caliber they would offer too great a resistance to the water when the boat is running submerged. The difficulty about rusting applies to both classes, as even with the disappearing gun the chamber into which it descends can hardly be made water-tight; therefore to reduce the action of the sea water all parts of the gun are made of special non-rusting nickel steel.

Messrs. Krupp, in 1913, brought out the two guns for submarines, shown below. The first is a 37 mm. (1½ inches) gun on fixed pedestal, suitable

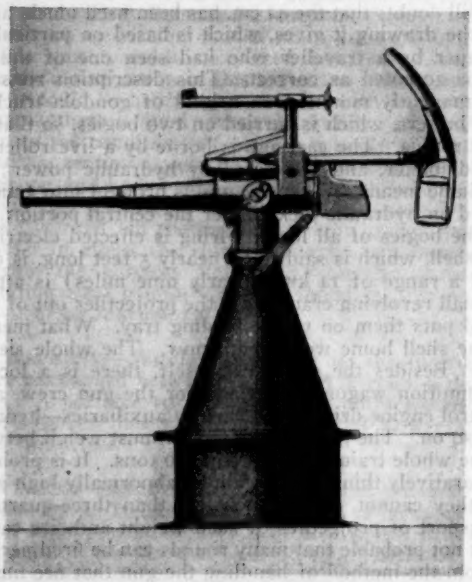

FIG. 1.—SUBMARINE GUN ON FIXED PEDESTAL

for firing at other submarines or for exploding mines on the surface. To reduce the resistance to the water the pedestal is of narrow lenticular section fore and aft. The larger gun, which disappears into the superstructure, is a short but powerful 12-pounder of 75 mm. (2.95-inch) caliber, capable of sinking a torpedo-boat. It can also be fired vertically to engage an airship. The gun is mounted on a pedestal which is pivoted horizontally at the deck level; when the gun is pointed vertically it is nearly in line with the pedestal, and the whole gun and mounting can then be revolved about the horizontal pivot and lowered into a shallow recess in the deck. The pedestal is balanced by springs, so that little effort is required to raise or lower it, and it is stated that the gun can be raised and fired in 20 seconds and returned before diving in even less time.—*The Engineer*, 11/27.

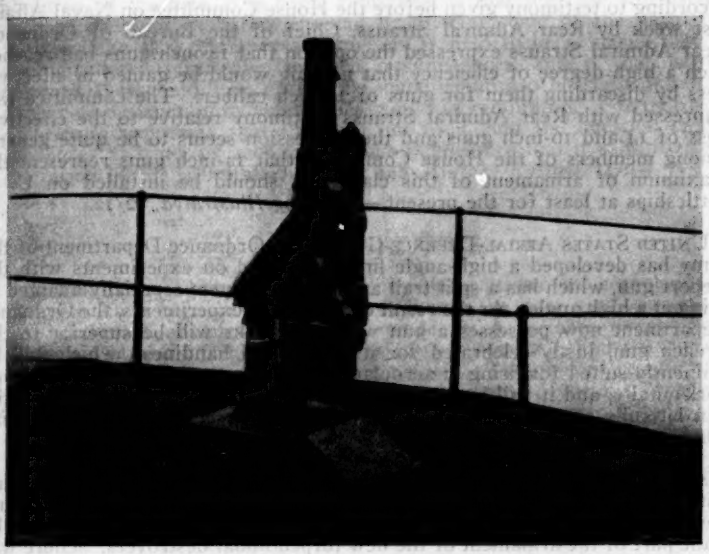

FIG. 2A.—GUN RAISED AND RECESS CLOSED

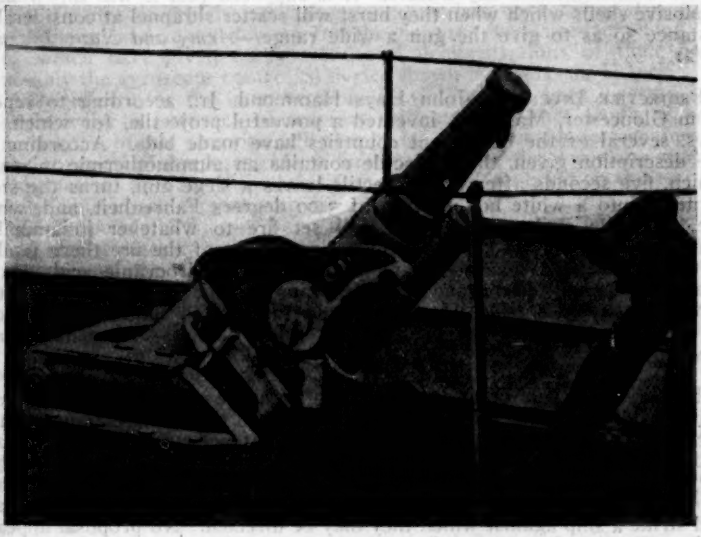

FIG. 2B.—GUN BEING RAISED

The Navy Department is not ready to install 16-inch guns on battleships, according to testimony given before the House Committee on Naval Affairs last week by Rear Admiral Strauss, Chief of the Bureau of Ordnance. Rear Admiral Strauss expressed the opinion that 14-inch guns had reached such a high degree of efficiency that nothing would be gained in effectiveness by discarding them for guns of 16-inch caliber. The committee was impressed with Rear Admiral Strauss' testimony relative to the effectiveness of 14 and 16-inch guns and the impression seems to be quite general among members of the House Committee that 14-inch guns represent the maximum of armament of this class that should be installed on U. S. battleships at least for the present.—*Shipping Illustrated*, 12/12.

UNITED STATES AERIAL-DEFENCE GUN.—The Ordnance Department of the army has developed a high-angle fire gun, based on experiments with the Deport gun, which has a split trail and a recoil system especially adapted to firing at a high angle. As the result of important experiments, the Ordnance Department now possesses a gun which it thinks will be superior to the French gun, justly celebrated for its speed and handiness, which will be eminently suited for firing at aeroplanes. The new gun is of greater range horizontally, and it will be possible without moving the carriage to fire the gun laterally at a greater angle than with the present carriage.—*Scientific American*, 12/12.

A satisfactory test has been made at Indian Head of an anti-aircraft gun. Kites were employed and the records made by the new gun in demolishing the flying targets are so gratifying that it has been adopted and will be made part of the armament of the new torpedo-boat destroyers. There will be two of the anti-aircraft guns on each destroyer. Just what the character of this new type of gun is will not be known until the guns are ready to be installed on the destroyers. It is known that it is automatic and uses shells with night and day tracers. It is supposed that it will throw high explosive shells which when they burst will scatter shrapnel at considerable distance so as to give the gun a wide range.—*Army and Navy Journal*, 11/21.

PROJECTILE INVENTED.—John Hays Hammond, Jr., according to report from Gloucester, Mass, has invented a powerful projectile, for which, he says, several of the belligerent countries have made bids. According to the description given, the projectile contains an aluminothermic mixture, which, five seconds after the projectile leaves a siege gun, turns the steel contents into a white hot mixture of 5400 degrees Fahrenheit, and, when the projectile strikes, the liquid will set fire to whatever inflammable material it encounters. To prevent extinguishing of the fire there is also in the projectile a separate chamber walling in hydrocyanic acid, whose deadly fumes will discourage efforts to approach the vicinity in which the projectile explodes. Mr. Hammond said the United States Government is experimenting with the projectile at Sandy Hook.—*Army and Navy Journal*, 12/26.

TORPEDO NETS.—A point in connection with the naval side of the war which has been commented upon locally has been the discontinuance of the use of nets on our warships for torpedo defence. Until a few years ago every ship was fitted with booms to carry nets for that purpose, but they were done away with on the alleged ground that the torpedoes are provided with shears that will cut the nets and thus permit them to pass and strike a ship against which they may be directed. No proposal appears to have been made to strengthen the nets, as would seem to be easily practicable, by fitting in them at the water line and for some distance above and below it, thick, hard steel rods, which could not be sheared. If that were done the nets would obviously be a secure defence, and the rods could

be fitted in lengths convenient for stowage. The strange feature of the abolition of the nets, it is being remarked, is that they are still used for defence on ships in harbor, as can be seen at some of the naval ports to-day. The fact that they are so used is held to be evidence that they are considered serviceable in such circumstances, and if that is really the case, they could, it is argued, be made equally so on ships at sea, and danger of destruction by submarines would be minimized. For that reason surprise is expressed that they are not used, and the question is being spoken of as being of such momentous importance that it calls for reconsideration by the Admiralty.—*Naval and Military Record,* 11/25.

AERONAUTICS

AERONAUTICS.—Although no striking innovations in aeroplane construction have been brought forward during the past year, nevertheless that important advances have been made in the science of aviation is evidenced by the more perfect control that is apparent, and the increased reliability and endurance of the later models. The general results of improvement are marked, and are due to refinements of details, largely the result of continued scientific study of the underlying principles, and the experiments conducted in the laboratories that have been established for the purpose. One direction in which these studies have made themselves evident is in the increased flexibility in speed, and the possibility of flying at lower speeds than heretofore, it being recognized that the ability to vary the speed of a machine within wide limits is a practical necessity.

In the way of records there is little to report, the war intervening about the time the important competitions were due; but mention may be made of two flights from Paris to Cairo, one by way of Constantinople in eight stages. The altitude record appears to have gone to Linnenkogel, who attained 21,654 feet, as against 19,685 for last year.

A feature to which increasing attention has been given is automatic stabilizing, and many devices for the purpose have been invented, some of which have given really wonderful demonstrations of their powers, notably the gyroscope controlled device shown by Sperry in France.

The efforts for the improvement of aviation have been directed almost exclusively to purposes of warfare, but anything that tends to perfect aeroplanes in this direction will also be largely applicable to machines used for commercial purposes. As a fighting machine the aeroplane surpassed expectation, and for the work of scouting and observation it has proved invaluable in the present war.

More powerful motors have made possible machines of greater speed and also greater carrying capacity, as was evidenced last year by the appearance of the great Sikorsky plane; but development in this direction has apparently been slow.

What promised to be the sensation of the year was the flight across the ocean, in which but one candidate for the prize developed; but unfortunately, or possibly fortunately, the outbreak of hostilities necessitated a postponement of the plans.—*Scientific American,* 1/2.

MILITARY AIRCRAFT IN THE WAR.—The splendid testimony which Field Marshal French pays in his despatches, to the work of the Flying Corps during the operations in France and Belgium, shows that it is to this arm that military commanders on the continent are looking for detailed information about their opponents. The military airmen are really the arbiters of strategy and tactics, and on them the commanders-in-chief are relying for their news as to what is happening behind the hills and cavalry screens. Fortunately, for us, a few months before hostilities broke out, there were signs of considerable activity in our military aviation circles, and an effort was made to undo the neglect we had formerly experienced

in this important branch. With the aid of our French ally, the aircraft department has rendered yeoman service, and has obtained for our commanders at the front accurate information as to the disposition of the enemies' forces. In former days we had to depend on cavalry to spy out the land, but cavalrymen are now obliged to admit they cannot secure this information for their chiefs so effectually as aircraft can. It speaks well for our mounted branches, however, that they maintain their old spirit, although the fact is forcing itself home that even if they make a successful reconnaissance, their slow methods of transmitting the information they obtain to the supreme commander are no longer of the value they were in earlier wars, owing to the necessity for making swift and accurate dispositions to meet the needs of the modern strategy now displayed. Cavalry can still get reliable information about army corps and other large bodies of troops moving in a given area, but as regards the actual strength of the enemy or any particulars of their composition and dispostions, these are details that are almost out of cavalry reach and which aircraft are now obtaining with such accuracy as to enable our commanders to so dispose their troops as to score success after success.—*United Service Gazette*, 10/29.

ARMORED AEROPLANES.—The armored aeroplane, is armored with steel plates of special construction so that its speed is not checked, and so as to be able to give battle in the air or fly away at will. All types of machines for speed (monoplanes or biplanes) have the propeller in front, and therefore it is impracticable to place a quick-firing gun in front of the machine in the ordinary way. The gun, even if so placed, would only be able to shoot in one straight line in front. The greatest danger of all is that by putting all weight in front of the machine it becomes top-heavy. To overcome this and other difficulties, says a writer in *The Empire Magazine*, engineers and constructors have experimented with all sorts of combinations. They have tried to bring the motor and the propeller at the back of the machine, or to bring only the propeller behind the aviator, as in some biplanes, or to shield the propeller in some way by a screen. But whatever method or design was followed the construction became, in each case, very complicated and gave a large increase in weight. The speed, too, was greatly reduced, so that the first essential of an armored aeroplane—the choice of fighting or flying away—was not realized. A brilliant French engineer, M. Bechereau, eventually succeeded in solving the problem. His invention gave the operator an opportunity to shoot right over the propeller in all directions, and during the flight he can sit down and travel as an ordinary passenger. To work the mitrailleuse he stands up and can shoot six to eight hundred bullets a minute at the enemy. The operator is protected by a screen against the wind of the propeller or against shots from the enemy in front or at the side. The screen is formed by two to four leaves which can be folded so that if they do not serve as a shield for the operator they are folded up and give no resistance in flight, and therefore do not interfere with the speed. Within a few seconds the passenger (or operator) can open the screen and take up his position to operate the mitrailleuse. When the screen is closed up there is nothing extraordinary to distinguish the machine from any ordinary monoplane.—*Army and Navy Gazette*, 11/12.

TORPEDO ATTACK FROM AIRCRAFT.—To render torpedo attack absolutely effective, the torpedoes should be launched at a distance of between 1500 and 2000 yards, at which ranges the torpedo officer can estimate the speed of the ship aimed at so closely that the torpedo with its high speed of 35 to 40 knots is certain of finding its quarry.

The problem of delivering torpedo attack at this close range has been worked out along novel and promising lines by Admiral Bradley A. Fiske of our navy, who has conceived the bold idea of using a swift and powerful

aeroplane for bringing the torpedo within the point-blank zone of fire and delivering the attack at distances which will make a hit inevitable. Fiske's method is to attach the torpedo below the body of the aeroplane in such a way that its axis will coincide with the longitudinal axis of the machine. The attachment is such that the airman, by pulling a lever, can release the torpedo at the moment when it is aligned on the proper course to make a hit. Once it has dropped into the water, its automatic mechanism will submerge it to the required depth of about 15 feet and steer it unerringly to the target.

In making the attack, the aeroplane would rise to an altitude of from 2000 to 2500 feet, and approach until it was within striking distance, when it would descend in a sharp spiral within a short distance of the water. The airman would now steady his machine for an instant, until it and its torpedo were pointing on the true line of fire, when the attack would be delivered by the simple pulling of the lever above mentioned.

The preferred time of attack would be on a clear night on which the dark mass of the ship to be attacked would be plainly discernible from above. The chances of discovery by the searchlights of an enemy before the aeroplane was within firing distance would be remote; and even in case of discovery, it would be difficult for the ship's guns to hit a fast-flying machine that was descending in rapid spirals of small diameter.—*Scientific American*, 12/26.

ENGINEERING

The steam turbine continues to demonstrate its superiority as a drive for large, fast ships, and the success of the various types of transformers indicates that ultimately a combination of turbine and transformers, and to a less extent of oil engines and transformers, will become general. The mechanical drive of Westinghouse, the hydraulic reduction gear of Foettinger, and the electric reduction gear as used on our collier *Jupiter* have all shown excellent results. Certainly the most remarkable development in this direction has been the decision of our navy to install electrical reduction gear on our largest battleship, the 32,000-ton *California*. This action was taken as the result of the excellent results obtained on the collier *Jupiter*. The merchant marine of the world continues to show marvelous growth, Great Britain leading with a tonnage nearly one-third greater than that of all the other maritime powers combined. The totals are: Great Britain, 20,275,791 tons; Germany, 4,998,746 tons; United States, 3,489,736 tons, chiefly domestic shipping; Norway, 2,475,323 tons; France, 2,246,504 tons; Japan, 1,700,062 tons, and Italy, 1,571,761 tons.—*Scientific American*, 1/2.

THE MOTOR SHIP.—In regard to one of the most important aspects of the Diesel question, the motor ship has more than fulfilled all that was anticipated from it. Whatever else may now be said against the employment of the marine oil engine for the propulsion of vessels, it cannot be averred, even by the stanchest advocate of the steamship, that there was any exaggeration in the figures which were originally given for the consumption of fuel oil for the main and auxiliary machinery. It can in fact be deduced from the results attained during the course of the past two years that the claims made were perhaps somewhat conservative, and the general statement that a motor ship consumes one-fourth of the weight of the fuel of a corresponding steamship certainly did not err in favor of the motor vessel. On the basis of the average figures obtained from a number of motor vessels equipped with engines of both types, it would seem fair to say that while boats in which two-cycle engines are installed give a consumption of just over one-quarter of the weight of coal used in a similar steam vessel, those equipped with motors of the four-cycle type often use considerably less than one-fourth the weight of coal.—*Shipping Illustrated*, 1/2.

REFUELING WARSHIPS AT SEA.—Extracts from a paper read by Mr. Spencer Miller at the last annual meeting of the Society of Naval Architects and Marine Engineers, held in New York City, December 10 and 11, 1914: The year 1914 witnesses three important blockades: the British in the North Sea, the British-French in the Adriatic Sea, and the Japanese at Kiao Chau Bay. The Japanese maintained their blockade for ten weeks and were successful. At the present writing the blockades in the North Sea and in the Adriatic Sea have been maintained for 14 weeks and in that period each ship has replenished its bunkers at least ten times. "During the U. S. Civil War federal cruisers while searching for the *Alabama* were constantly obliged to quit that portion of the sea allotted to them in order to fill their bunkers, after one or two useless chases after suspicious looking vessels." Since August 1 the German cruisers have played the part of the *Alabama*. Many British and French cruisers have been protecting commerce and chasing the German cruisers. In fact the British Admiralty announced that some seventy ships of the Allies were searching for the German cruisers. The *Good Hope* and *Monmouth* allowed their position to be known to the Germans by entering a harbor for coal. They were sunk later by the Germans.

It is a matter of record that while our fleet was blockading Santiago frequently one-fourth of our ships were absent for re-coaling, and when the Spanish came out three of our ships (one the battleship *Massachusetts*, which cost the government originally over $6,000,000) were 45 miles away, coaling at Guantanamo, utterly useless for fighting purposes. In 1904 Admiral Togo blockaded Port Arthur, while the attempt to blockade the Russians in Vladivostok failed. The author has the word of a Japanese naval officer on board the Japanese blockading ships before Vladivostok that the only reason they failed to bottle up the Russian cruisers was because they were unable to coal their ships in a seaway.

By way of example, suppose the British employ 100 cruisers for blockade duty in the North Sea, costing an average of $2,000,000, each. This would represent a total investment of $200,000,000. Practically all burn coal. Considering the distance to shore coaling ports, it is difficult to believe that more than 85 per cent of these cruisers are maintained on blockade duty unless they refuel at sea. Fifteen per cent of these ships absent coaling at a shore base represent a temporary weakening of the blockading fleet of 15 ships, worth in money alone about $30,000,000. This blockading fleet of 100 cruisers could be maintained close to 100 per cent efficiency if served by colliers equipped to deliver coal to them under all reasonable conditions of the sea. Does not this illustration serve to indicate the value of mastering the art of refueling warships in a seaway? Thirty million dollars would purchase 25 big colliers like the U. S. S. *Jason* and *Orion*. These huge 19,000-ton colliers, with their modern, high-speed, broadside coaling gear, actually coal three ships in a day when the sea is smooth. When the sea is moderate, and not unreasonably rough, each collier, equipped with marine cableways, could deliver to a cruiser 500 tons of coal in the daylight hours, steaming at 10 to 12 knots while doing so. When submarines are present ships must keep moving at a speed to 10 knots at least.

The year 1914 witnessed the triumph of the submarine and the automobile torpedo. It has already been demonstrated in English maneuvers that the submarine finds its victims by lying in wait in the vicinity of the known coaling ports of the enemy. The author believes that when all the circumstances connected with the sinking of the British ships in the North Sea come to light it will be found that these vessels were sunk either on their way to or from their coaling base. The triumph of the submarine therefore seems to indicate that the safe place for refueling is on the high seas.

The marine cableway on the U. S. collier *Cyclops* comprises the following elements:

(1) A main trackway cable 1-inch diameter, 900 feet long, spanning from mainmast of collier to portable spar on quarter-deck of battleship. (2) An

automatic tension engine with two 13-inch x 13-inch cylinders for taking up and paying out suspended cable, maintaining practically a uniform tension of 18,000 pounds. (3) A load carriage running on the main cable adapted to carry 4000-pound loads. (4) A conveying rope in two parts, an inhaul rope ½-inch x 875 feet and an outhaul rope ½-inch x 1625 feet, one end of each being attached to the load carriage. (5) Two high-speed automatic tension engines, each with two 10-inch x 10-inch cylinders for hauling the load carriage at a speed of 2000 feet per minute and automatically maintaining the tension in the conveying lines when the carriage is standing still at either terminal. (6) Hauling down apparatus on the collier whereby the cable and load carriage are lowered for receiving the load. (7) Lowering apparatus on board the battleship whereby the cable and load carriage are lowered for delivering the load and receiving the empty bags.

Some of the military uses of the automatic tension engine are as follows: (1) In connection with the marine cableway for coaling warships in a seaway. (2) Supporting an oil hose between two ships fuel bunkering at sea. (3) In connection with the marine breeches buoy apparatus for life saving at sea. (4) Salvage work. (5) Landing guns ashore.—*Shipping Illustrated*, 1/2.

REPAIRING GERMAN SHIPS AT SEA.—The German naval authorities appear to have planned for every eventuality, including a means whereby any of their torpedo craft or submarines as are not too seriously damaged in a sea fight may be repaired practically on the spot. They have built several sea-going dockyards in the shape of huge double-hulled vessels, filled with machine tools, which can lie behind the actual fighting line and pick up and repair any of their mosquito fleet. These vessels have been built in accordance with the plans of Ph. von Klitzing, of Kiel, their chief naval constructor, and which, it may be mentioned, were drawn out under the direct supervision of the Kaiser himself. The first of these repair vessels was laid down by the Howaldtswerke at Kiel, but it is not definitely known how many are actually in commission at the present time. The distinguishing feature of these vessels is their immense beam as compared with their length. The reason for this is that there is sufficient space between the twin hulls to accommodate one of their big 35-knot torpedo-boats, or a submarine of the latest type, such as that which sank the *Aboukir*, *Cressy* and *Hogue*. These hulls are linked together fore and aft by steel girders built up of angle and plate steel, and are of great strength. During the construction of the first dockship a number of experiments were made before the final arrangement of these girders was agreed upon, but such is the stiffness of the latest form that a submarine or torpedo-boat when housed can continue to run under its own power, and so aid the joint progress of itself and its dock without bringing any undue strain on any part of the structure. The linking and joining of the girders is such that the dockship can either steam up to a damaged boat and pick her up, or remain stationary whilst the vessel runs between the hulls.—*United Service Gazette*, 9/15.

THE APPLICABILITY OF ELECTRICAL PROPULSION TO BATTLESHIPS, TOGETHER WITH THE EXPERIENCE GAINED WITH IT ON THE "JUPITER." By Lieutenant S. M. Robinson, U. S. Navy. *Abstract.*—The object of this paper is to show the best method of ship propulsion to be applied to battleships. It has been attempted to keep out all matters that do not bear directly on this one point. The *Jupiter* has been introduced merely to show the reliability of the apparatus that it is proposed to use. The Navy Department has authorized an electrical installation for the new battleship *California*, and it is believed that she will mark the beginning of a new era in marine engineering.

Briefly, the machinery for a battleship would consist of two turbo-generators running at a maximum speed of about 2000 revolutions and

generating current at about 3,000 volts, two switchboards and four induction motors. The latter would be arranged with one on each of four shafts. The motors would be of the double squirrel cage type and the stators would be fitted with pole-changers which would give the motors two different numbers of poles and consequently two speed reductions. The motors would have two independent squirrel cage windings, the outer one having conductors of high resistance and the inner one conductors of low resistance. At high frequencies, such as would obtain in the rotor when starting up or backing, the inner winding takes practically no current due to its high resistance under these conditions; therefore the high resistance winding on the outside is the only one in operation and this insures a large torque for starting or backing. When running close to synchronous speed, the resistance of the inner winding is much reduced and it then operates like any ordinary squirrel-cage motor.

In choosing a method of propulsion for battleships, there are six points to be considered. They are, in order of their importance: (1) Reliability, (2) maneuvering qualities, (3) economy, (4) space occupied, (5) weight, (6) care and upkeep.

Reliability.—Taking these points in their order, the first to be considered would be reliability. The reliability of induction motors and large high-speed turbo-generators for land use has been well known for some time, but up to about one and one-half years ago had not been demonstrated on board ship. However, experience at sea with them has not developed any trouble, and their reliability is now unquestioned. There are several things that go to make an electric installation more reliable than any other. First, the installation is in duplicate throughout and the breaking down of one engine does not affect the ship except at high speed; it might be said that this is true of other installations, but it is not true in the same sense nor in the same degree that it is with the electric drive. For example, if one turbo-generator breaks down, the ship can still run in a perfectly normal manner up to a speed of about 19 knots. This would be impossible with any other mode of propulsion; even at speeds within the power of one engine on a twin-screw ship the maneuvering qualities would become so bad as to handicap the ship; in fact, a twin-screw ship operating with one engine would be able to reach port safely but would be of very little use in battle, whereas an electrically-driven ship, operating with one turbine, would be just as good as any ship up to a speed of about 19 knots.

Then, too, there is the question of auxiliaries; with other forms of propulsion, if the auxiliaries in one engine-room break down, that engine-room may be almost entirely put out of commission. Of course the main air and circulating pumps are cross-connected, but when operating that way they are not very satisfactory and I have seen a battleship forced to stop because the forced lubrication pumps in the starboard engine-room broke down. If the ship had gone ahead with the port turbines, the starboard turbines would have revolved and burned out the bearings, so that it was necessary to stop the ship and repair pumps; with electric drive it would be a simple matter to shift to the other engine-room and make repairs without stopping.

There is one thing that makes the installation more reliable than other forms of turbine drive, and that is the fact that the turbine revolves in the same direction all the time. The importance of this cannot be overestimated, as it is believed by operating engineers that the greater amount of blading trouble that ships have had is nearly always due to the distortion that occurs when backing. There is also one other advantage when compared with reciprocating engines, and that is that the turbines would be less susceptible to damage by water when the boilers are priming. This fact has been thoroughly demonstrated by experience on the *Jupiter*.

Maneuvering.—As regards maneuvering qualities, it is believed that the electric drive is far superior to any other method. This point will be taken up more in detail when the *Jupiter's* installation is discussed. It is rather difficult to describe these advantages on paper, but very easy to appreciate when you see the machinery working. Instead of big heavy throttles to open and close, there are light, easily handled oil switches, and a speed controller that can be handled with one finger. The engine-room watch required for a battleship would be just half what it would be with other means of propulsion, as one engine-room would be idle practically all the time. In a rough sea there is no racing, with its attendant strains on machinery and on the personnel on watch. Any desired speed can be very quickly attained. The speed can be very accurately maintained and without any effort on the part of the personnel. These last two points are of very great importance on battleships when maneuvering in formation. The stand-by qualities are also superior to those of other installations, for at a very small expense in the way of steam the main turbine can be kept running very slowly and the engine-room is then ready to answer signals at any time; this might be of great importance to a battleship. The backing qualities of this installation are also superior to other forms, particularly turbine installations. It is possible to attain full power in the astern direction.

Economy.—In considering the question of economy, we have reached the point which first suggested the use of electricity for the purpose of propulsion. None of the older forms of propulsion, such as reciprocating engines or direct connected turbines, can compare at all favorably with this method, the gain in economy being over 20 per cent at high and cruising speeds. The only other method of propulsion that would appear to compete with this method in economy would seem to be the combination of high-speed turbines and reduction gears. The loss in the latter amounts to about 2 per cent, while in the electric reduction gear the losses are from 8 to 9 per cent. Mechanical reduction gears have been developed to a high degree, and it is very probable that in quite a number of cases the mechanical gears would be preferable to the electric drive, but as this paper is limited to a discussion of battleships that subject will not be touched.

For battleships I do not believe there is any question of the relative economy of the two methods—the electric drive is far superior. The electric reduction method possesses two inherent advantages that the mechanical method cannot overcome. First, the electric installation uses only one turbine at low powers; second, the induction motors are fitted with pole changers which allow the turbine to be run at normal speed with the ship cruising at low speed—in other words, the electric drive permits of two speed reductions while the mechanical gear has only one. These two advantages exist no matter how the two installations may be laid out, and they far outweigh the difference in the losses of the two methods. To show just how great these advantages are, two curves are shown. Fig. 1 shows the *Jupiter's* turbine operating under varying loads and Fig. 2 shows the turbine operating under varying speeds (and also loads). The load curve does not really show how very bad the conditions are for a battleship, as in that case the power at 12 knots is only about one-seventh what it is at 21 knots and the curve shown does not give so great a per cent of reduction. It will also be seen that the speed curve is very steep at the low speeds and shows the bad effect of reducing turbine speed very greatly. As nearly all the cruising of a battleship is done at fairly low speeds, it is evident that the electric drive will be more economical than the mechanical gear.

In addition to the two advantages just stated, there are a number of other things entering into a comparison of the two methods that make it very doubtful if the mechanical gear would be as good, even at the high speeds, as the electric reduction. It would probably be necessary to use at least four turbines with a mechanical gear instead of two, as with the

electric method; this fact alone would make the electric reduction the more efficient of the two. Then there are also the very considerable losses due to the friction and windage of the backing turbine. According to Sir Charles Parsons this loss amounts to about one-half a per cent. Also there would be a saving due to the fact that only one set of auxiliaries would be used at a time.

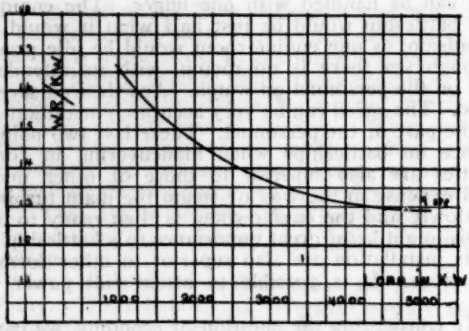

FIG. 1.—4000 K. W. TURBINE, U. S. S. "JUPITER"

Space Occupied.—As regards the actual space that the machinery would occupy, the electric drive would take up less space than any other installation, with the possible exception of the mechanical gear. The arrangement of the machinery, however, is so much more flexible with the electric drive than with other methods that it is probable it would occupy less space than would the gears. It lends itself very readily to watertight subdivision.

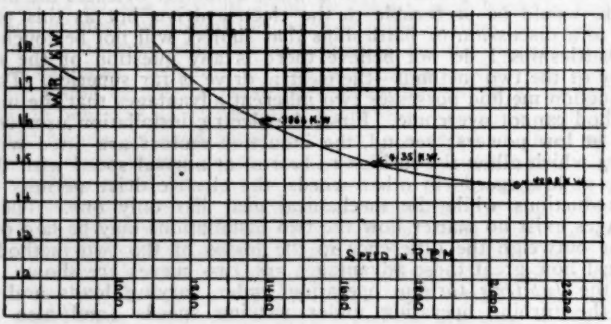

FIG. 2.—4000 K. W. TURBINE, U. S. S. "JUPITER"

Weight.—The next point to be considered is that of weight, and here again the electric drive is superior to any other method with the possible exception of mechanical gears. It is rather difficult to say exactly how the two methods would compare either as regards space or weight, as a great deal would depend on the number of turbines used with the mechanical gear in order to get 30,000 shaft horsepower. However, if the largest sizes of geared turbines now at sea are any guide, the weight of the electric drive would be less than the weight of the geared turbine.

Care and Upkeep.—As regards care and upkeep, the electric drive is greatly superior to either reciprocating engines or direct-connected tur-

bines; also due to the fact that the turbines do not have to reverse, it would be superior to the geared drive in that it would have less blading trouble. Either of the two latter methods, however, is very satisfactory in this respect, as a high-speed turbine is so small that it is easily handled and repaired by the ship's mechanics.

This completes the case of the electric drive for battleships; all of the points have been considered and in every case it has been seen that it has no superior. There are, however, some points that have been made against electric propulsion, and these will be taken up before proceeding to a discussion of the *Jupiter's* installation. First, there is the danger from large quantities of water in the engine room; however, this danger is more fancied than real, as all the wiring could be placed well overhead, being taken out of the tops of the motors and generators. The generators could be placed high enough to insure their safety and the motors could be placed in watertight pits so that the engine-room could have enough water in it to put the auxiliaries out of commission before reaching the main engines. The next point is that, when operating with one turbine, all motors must run at the same speed if they run at all; this fact has been found to be no handicap in actual operation. The next point is that in turning, the inboard screw does not slow down; this slightly increases the turning circle, but does not increase the space necessary to turn in, as the inboard screw can always be stopped or backed.

The equipment on the *Jupiter* is similar to that which would be used on a battleship, so it offers a good example of many points that have been advanced in favor of the electric drive.

The U. S. S. Jupiter.—The *Jupiter* has been in commission over a year and a half. During that time she has conducted two official trials and has carried on the usual routine work of a navy collier. She has steamed about 14,000 miles and has been handled a great deal around docks, in narrow channels, and other places where a great deal of engine handling was required. About one-half of the steaming has been done in the tropics with circulating water over 80 degrees F. and with correspondingly poor vacuum, so that the economy of the ship is known under all conditions. The fuel economy has proven to be excellent, being, on the average, about 25 per cent better than the best of her sister colliers.

During the whole period of commission, two repairs have been made to the main engine. The first was to reblade the first stage of the turbine. This work was done entirely by the ship's mechanics. The first stage blading was injured by a bolthead from the segment carrying the fixed blading. The bolt was broken off, probably through having been set up too hard while assembling. These bolts were all tap bolts and have been replaced by filister head screws with countersunk heads and a repetition of the accident would not be possible. The accident, however, was in no way peculiar to the electric drive, as it might very well have happened to any other engine. The other repair was to replace one of the porcelain cylinders which carry the resistance; this cylinder was cracked when the ship went into drydock, but it was never discovered whether the cracking was due to the oiler putting undue pressure on the cylinder or due to some strain brought on it when the ship settled on the keel blocks. At any rate the damaged was repaired by two machinists in about two hours.

The amount of work expended in keeping the equipment in condition has been very small. After coming in from a run, the turbine clearances are taken to see if they have changed; and the motor clearances are also checked; there has been no change in either of these clearances up to date. Before getting under way the holding-down bolts of the turbine are gone over to see if they are tight, the slip rings on the motor of the generator are examined to see if they are clean, and all insulators are also examined for cleanliness, all connections are generally gone over to make sure they are tight, the oil switch boxes are examined to see if they have the proper amount of oil, and the governor control-valve springs are tested to see

if they have the proper tension. After starting the turbine, the emergency trip is tested. In port the oil pump is run once a week to force oil through the turbine bearings and the motor shafts are jacked daily. Due to the fact that the main condenser is used a great deal (the auxiliary condenser being too small to handle the coaling winches), the small pump for draining the turbine casing is run for a few minutes each day when in port to make sure that no water may be allowed to accumulate in the turbine.

In operation the *Jupiter's* engines have been highly satisfactory. There has been only one time when anything has happened during the handling of the engines and that was the tripping out of an exciter. The lighting set was immediately put on for exciting and the engines were ready to use again in about one and one-half minutes. If such an accident were to happen again it would take even less time, as the men are more familiar with the installation. At the time the accident occurred the ship had just left the navy yard for the first time.

The handling of the engines has been proved more than once; the ship has been handled a great deal in narrow waters and around docks. She steers very badly at times and the quick response of the engines has more than once helped in getting out of difficulties. The engines have been used to swing ship for compass deviation without putting any way on the ship at all, the total space used for swinging being little more than the ship's length.

The ability of the turbine to stand severe abuse from water has been demonstrated several times. There is no separator on the main steam line, and several times the boilers have primed and carried considerable water over into the turbine. This was particularly noticeable during dock trials, when it was impossible to properly handle the boilers. The only indication the turbine gave was an increase in the first stage pressure and a rattle in the casing as the water was hurled through at a high rate of speed, but the turbine blading showed no signs of bad effects from this.

The backing qualities of the engines have proved to be all that could be desired; if the ship is cruising with the resistances in, the time taken for reversing is practically nothing at all; if the resistances are out, it takes a few seconds—not more than three.

When under way the engine-room is very cool, due to the fact that the generator is fitted with air impellers at each end which take their suction from the engine-room, thus insuring a good circulation of air.

After all, the greatest test of the satisfactory working of any machinery is whether the men who are actually handling it and caring for it are pleased with it. If this test applies to the *Jupiter's* machinery it certainly is an unqualified success. In particular is this true if the matter is referred to the coal passers in the fire-room who have to handle much less coal than do the men on sister ships. The ship can make her contract speed of 14 knots without using forced draft at all.

RECENT DEVELOPMENT IN SUBMARINE SIGNALING. By J. B. Millet. *Abstract.*—The system of sending warning signals under water from shore to ship or from ship to ship has now been accepted and put in operation throughout the world. There are in all nearly 200 signal stations in operation to-day which may be used by ships approaching in fog or thick weather. Nearly all the large shipping companies in the world have one or more ships installed with a receiving apparatus which enables them to locate their position by listening and ascertaining the direction through the submarine bells, which are operated as a part of the lighthouse service of the various countries. Over 1200 vessels are equipped with a receiving apparatus and a proper notation is now placed against all vessels so equipped in Lloyd's "Register of British and Foreign Shipping," "Record of American and Foreign Shipping," "Bureau Veritas" and the "Germanischer Lloyd."

Within a short time an apparatus has been invented by Professor Reginald Fessenden, called the "oscillator," which consists briefly of a heavy dia-

phragm operated under water by means of electric current, and which can be used for sending signals by the Morse alphabet. This apparatus has been used successfully in detecting the presence of icebergs by sending sound through the water and then ascertaining the direction from which the echo comes. Signals sent by this oscillator have been distinctly heard at a distance of 30 miles. Battleships, transatlantic steamers, and all other large vessels, if equipped with the oscillator, are therefore afforded a means of intercommunication. Since the oscillator is not only a transmitter of sound but a good receiver of sound, it serves a double use. If submarine boats are equipped with the oscillator, they should be enabled, without much difficulty, to detect the presence of any vessels which they wish to strike, by listening to the sounds which are inevitable on any large steamer. It would therefore follow that a submarine boat could detect the presence of its mark when several miles off, and without using its periscope it could make its attack. It could also communicate with its headquarters and receive and give any messages that are desired. It is, therefore, seen that this invention should add greatly to the efficiency of a submarine boat, as it has already added greatly to the safety of ships at sea.—*International Marine Engineering*, 1/15.

SUBMARINE SIGNALING AND A PROPOSED METHOD OF SAFE NAVIGATION IN FOG. By Commander F. L. Sawyer, U. S. N.—The sole means of avoiding collision in a fog at the present time is that prescribed by the rule of the road, viz., the fog whistle or siren. So far as range, efficiency and reliability are concerned, the fog signals of the largest vessels have made no appreciable advance since the largest man-of-war used steam as auxiliary to sail power. Fog navigation is still in the dark ages, and in this field has found itself literally "befogged." A system of handling vessels in a fog, which for want of anything better may be said to have worked fairly well with sailing vessels and low-powered steamers of small size and low speed, has under present-day conditions broken down. One scientific method to safeguard vessels against the danger of collision in fog is the submarine signal system, but the author pointed out that the difficulties yet to be overcome for an all-round submarine signal system are: (1) To attain an equal radius in all directions for sending. All systems using a diaphragm are directed. (2) To attain an equal audibility in all directions for receiving. (3) To eliminate the sound shadows caused by the vessel itself and the effect of the wake. Unless these deficiencies can be overcome, submarine signals will not be entirely satisfactory for naval purposes. The same defects are undesirable for fog navigation but not vital, and an arc of audibility somewhat greater than the 20 points of visibility required for the running lights of a vessel would if necessary suffice for safety. For many years since the advent of wireless, efforts have been directed to its use as the solution of fog navigation. A modification for shipboard of two directive aerials at right angles to each other and an instrument called a radio goniometer have been used to determine the bearing of the sending station. This radio "angle measurer" is rotated to the point where the received signal is most intense, thus indicating the bearing of the sending station or vessel. Vessels equipped with directive aerials and the radio goniometer could therefore communicate to each other in a fog their courses and speeds, and, so far as the accuracy of the instrument permits, gain an idea of their relative bearings. The deficiencies of this method alone for securing safety in fogs are not unlike those of the submarine wireless. The intensity of the signal depends upon numerous variable conditions, and the accuracy of the bearing depends upon the judgment of the observer as to the relative intensity of the signals. While possibly capable of accuracy when tested by a skilled observer in a laboratory, the fact that the intensity is not sharply defined but follows the sinusoidal curve would cause the practical navigator to mistrust its use as a sole dependable means of safety. The author submits that a satisfactory system of fog navigation would

require: (a) The presence of another vessel to be ascertained at least as far as the steamer lights are visible, namely, 5 miles. (b) A knowledge of the course and speed of the other vessel. (c) Information as to whether or not the bearing of the other vessel is changing, without changing the speed and course of either vessel. (d) Ample sea room to change course in case such maneuver is found necessary. (e) Simple means and apparatus involving no calculations or estimates to be made so that an intelligent enlisted man can carry out the method. In order to accomplish the above, the method proposed contemplates the use of the simplest form of wireless with any efficient form of submarine wireless. In case of fog, simultaneous signals are sent from a vessel, and instead of the six characters mentioned above only a single letter or number in the Morse code is necessary to be sent. The 26 letters and 10 numbers each represent 10 degrees of the compass, so that any course is signalled to the nearest 5 degrees, with an average error of less than one-quarter of a point. The observer, using an ordinary double head-piece receiver on another vessel, receives the wireless signal and submarine wireless signal, but not simultaneously, as the former is instantaneous while the latter, at 5 miles distance, for example, arrives more than six seconds later. This very considerable interval renders it easy to measure the distance between vessels with greater accuracy than necessary for purposes of navigation. After arriving within range of the submarine wireless signal, the vessels are able to know at all times their distance within an error that should not exceed 300 yards. In practical application of this method at sea, a standard wireless installation might be used, but such range and power are not required. A short wave-length of not more than 200 meters, such as is reserved for the use of amateur operators, would be sufficient for the purpose. The recent simultaneous tests of the Berger and Fessenden submarine systems have shown an effective range of 10 miles for both. A range of 5 miles should show four times this intensity, and therefore this element in the system appears to be solved. The method above outlined is said by the author to furnish the information necessary for safe fog navigation, namely, at a range of over 5 miles, speed and course of other vessel, whether her bearing is changing, sea room to maneuver if necessary, the condition that both vessels are able to hold their course and speed until bearing change is ascertained, and in addition the distance separating the vessels. Vessels having this knowledge will in nine cases out of ten find themselves passing more than one mile apart without either changing her course or speed.

CANALS

HALF THE CANAL'S TRADE IN U. S. VESSELS.—During the two months from August 15 to October 15, 113 vessels passed through the Panama Canal, carrying an aggregate of 583,949 tons of cargo. This result is declared to meet all expectations, especially in view of the European conflict. The traffic of the canal has followed fairly well defined trade routes and has been heaviest between the Atlantic and Pacific ports of the United States, which is reserved to vessels under our flag. These passages, 49 in all, have constituted 44 per cent of the traffic through the canal, while the cargoes carried have amounted to exactly 50 per cent of the total freight that has passed through the waterway. There has also been marked traffic of vessels from Pacific ports of the United States and southwest Canada to Europe, with grain.

A route between the eastern coast of the United States and the west coast of South America has developed a considerable volume of traffic; also a route from the Atlantic seaboard of the United States to China and Japan, on which refined petroleum in bulk and in cases, and other petroleum products, have been the principal items carried. Next to these four principal routes, the most notable development has been the coast traffic from the

Middle Atlantic seaboard of the United States to the Pacific coast of North and South America, coal being the principal cargoes transported between these points.—*Marine Journal,* 11/21.

By the Hay and Bunau-Varilla treaty, ratified by Panama in 1903, in consideration of the payment of $10,000,000 down and an annual payment of $250,000, beginning nine years after ratification, the United States was given "in perpetuity" the region known as the "Panama Canal Zone," a strip ten miles wide and extending three miles into the sea at either terminal. —*Marine Journal,* 12/26.

MISCELLANEOUS

SUBMARINES AND RAMMING TACTICS.—As the war progresses the value and the limitations of the submarine in active service are gradually being resolved. Equally, too, are we being enlightened as to the best method of replying to the menace of its attack. There is some reason for believing that our most modern warships are considerably less vulnerable to submarine torpedo attack than our older vessels. It is true that up to the present those ships that have been lost from this cause have been vessels of obsolete or obsolescent design. The reason obviously is that they, and not the modern vessels, have been most exposed to submarine attack by the nature of their duties. It is probable that in the design of a dreadnought battleship or cruiser special attention is devoted to securing immunity. But to rely wholly on any such means would, in our opinion, be to proceed in the wrong direction. The correct reply to the submarine should be offensive and not defensive. Of the submarines so far authentically reported lost in action only one has perished by strictly defensive means, namely, the *D 5,* when she struck a mine off Yarmouth. We do not know yet how the *E 3* was sunk. The *Birmingham* sank one by gunfire. The *Badger,* according to the British official report, sank another by ramming. We have now to add another, the *U 18,* also placed out of action by ramming. A third, but unofficial, report of a submarine being sunk by ramming came from Dunkirk on the 15th. It is possible that the three last instances will provide an inspiration for a future policy, and that just as the bayonet is once again the ultimate weapon of our infantry, so, too, will there be a reversion to ramming tactics for certain work in the navy. Modern conditions will not permit of all ships being designed with a ram, for all could not use it effectively. Specialization will have its say, and we may therefore expect to witness the development of a special class of vessel, the submarine destroyer, a very fast, very easily maneuvered vessel particularly designed for ramming submarines, and perhaps itself submersible, or partially so. —*The Engineer,* 11/27.

DANGER OF PERMANENT WOOD FITTINGS IN WARSHIPS.—The lesson of the war, so far as it has proceeded, fully bears out remarks which have been made in previous Pembroke Dock letters to *The Naval and Military Record,* as to the mistake of putting permanent wood fittings in warships. The danger incidental to the practice, as it has been followed hitherto, is that the wood is exceedingly liable to take fire when explosive shells are used, which appears to be the general practice, and in the majority of cases the ships which have come under severe gunfire have been set afire, and their loss in a number of prominent cases has been apparently mainly attributable to the fire. Nor does the danger appear to be confined to ships under gunfire, because the *Amphion,* which struck a mine, was almost immediately afterwards in a blaze, and the fire would seem to have exploded her magazine and caused the destruction of the ship. The *Monmouth* and *Good Hope* also were set on fire early in the action off the coast of Chile, and

there cannot be the slightest doubt but that the fire made it difficult, if not entirely impossible, for the guns to be efficiently served. The ships were, therefore, at the mercy of the enemy's ships, and in such circumstances their destruction was inevitable. In the case of the *Emden*, again, the hull was alight early in the action, and fire must have very considerably interfered with the working of her guns, fortunately, perhaps, for the *Sydney*, although there was no real necessity for her to have come within range, which she did, however, because, according to the report of the fight, her range-finder was disabled almost at the outset, and there were casualties on board. With such facts placed beyond doubt, it becomes a matter of importance to inquire as to what parts of the several ships actually took fire, and to that inquiry only one answer is possible. The main parts of the structures of all the ships being formed of steel, it must have been the deck planking which ignited, and, being continuous, would speedily, in the natural course of things, envelope the ship in flames. The planks forming the decks of all ships, whether British or foreign, following a rule of universal application in recent years, are composed of teak wood, which is highly inflammable, so much so that after it becomes ignited it would be almost impossible to extinguish it. The ships once set on fire would consequently be sufficiently crippled while the fire is in progress to enable an enemy not suffering from a similar incapacity to destroy them. This result would be wholly due to the wood of the decks, which obviously should not be fitted in future ships.

A similar objection applies with equal force to all permanent wood fittings, wherever situated, because, although there is a greater degree of the probability of fire commencing on the upper deck, it might begin below if there were wood fittings there, and an explosive shell happened to land near them, or if the fire began above it could easily travel to the lower deck, and thus possibly spread to the magazines and destroy the ship. All permanent fittings of wood should accordingly be dispensed with. The objection taken to them should not, however, be applied to portable fittings, such as wooden mess tables and stools for the use of the crew. In the recent rage to diminish wood fittings, some naval officers have wished to discontinue the use of such tables and stools, but in that they would appear to be carrying their opposition too far. Another leading lesson of the war has been that in vessels mined or torpedoed very little, if any, use could be made of the boats, some of which were damaged and others could not be lowered, owing to the ship heeling over or, it may have been, sinking before there was time to do so. In such a desperate emergency mess tables and stools of wood might possibly be thrown overboard, and thus be made the means of saving numbers of the crew who would otherwise be drowned. A man may be ever such a fine swimmer, but he cannot possibly survive long unaided in the water. For that reason, the stools and tables should be retained, but no other fittings of wood, excepting the ship's boat equipment, should be allowed. As regards the wood decks, segmental steel strips, in parallel lines, a couple of feet, more or less, apart, should, as has been before suggested in this column, be substituted. They would give the members of the crew a better foothold than the wood, and would, if wood fittings otherwise were dispensed with, render the ship so fitted immune from the possibility of fire in action. It is of interest to record that although, in the first instance it was intended not to provide wooden mess tables and stools in the crew spaces of the *Cordelia*, they were eventually put on board, as were some other fittings, not of wood, to which exception was taken, temporarily, after the details of the ship's proposed equipment had been designed and approved of.—*Naval and Military Record*, 11/25.

SHIP EXPLOSIONS.—The loss of the *Bulwark* has been described as the most complete disaster in the annals of the modern navy. The description appears to be entirely justified. Seven hundred men have not been lost in a single ship, so far as can be ascertained, since the *Queen Charlotte* was

destroyed by fire and explosion in the Mediterranean in 1800. This vessel had been despatched by Lord Keith to reconnoiter the Island of Cabrona, near Leghorn, and on March 17 fire was discovered on board. For hours the crew toiled to save the ship, but in vain. Their hopes of being saved were encouraged when boats were seen approaching, but the natives in the latter could not be persuaded to go alongside the vessel. In marked contrast to their timidity was the conduct of a boat from an American ship which, manned by three men, came to the side of the *Queen Charlotte* too incautiously, so that the wretched sufferers jumped from their burning prison in such numbers that all of them perished. Of course, the loss of the *Queen Charlotte* was not exactly a parallel to that of the *Bulwark*, which more nearly approaches the destruction of the *Edgar* by a magazine explosion at Spithead in 1711, or the *Amphion* at Plymouth in 1796. Gunnery or magazine accidents on such a scale, however, have been unknown in the British Navy for over a century, although several mishaps of the kind have befallen other fleets. The *Iena* and *Liberté*, in the navy of our gallant French Allies; the *Mikasa*, a Japanese battleship; and other vessels have been destroyed by magazine accidents in modern times. If there was any likelihood that the *Bulwark* disaster would teach lessons that might prevent future mishaps of a similar kind, there would be some slight compensation for the immense sacrifice of valuable lives; but this does not seem possible. At the same time, the accident may serve a useful purpose if it emphasizes the need for strict caution in everything connected with the handling and care of explosives on board ship, and the danger of any laxity in their manufacture or method of transhipment.—*Army and Navy Gazette*, 12/5.

SUBMARINES AND THE DENSITY OF SEA WATER.—Now that submarines and their work are so much to the front, and especially their underwater cruising and long spells in hiding on the bed of the sea, it is interesting to note that Lieutenant C. N. Hinkamp, of the United States Navy, has many informing things to say in an article which appeared in the August number of the *Journal of the American Society of Engineers*. He points out that the U. S. A. Navy has found that repairs of submarines at sea are among the best that American engineers have presented during the last few years, although some of the gasoline engines in their boats have proved particularly troublesome. He also deals with the density of water and its effects on submarines and their weapons—Whitehead torpedoes—in a very interesting and informing manner. He mentions that while making a static dive off Annapolis, it was found that a submarine could be balanced at various depths. On the addition of 100 pounds of water to the normal ballast the boat sank 15 feet, and held that depth after a few oscillations. More water was added, and, after sinking about 20 feet further, the boat remained at that depth. This was repeated until a descent of 70 feet was reached, when the boat rested on the bottom. It is thus shown that the density of water increases as the depth increases, and that strata of water exist as well as strata of earth. The existence of these strata of water, of varying densities, he thinks, may account for the large number of torpedoes lost in the vicinity of Chesapeake Bay, as torpedoes do not go straight down where the crews mark their leaving the surface.—*United Service Gazette*, 12/17.

SMALL VESSELS ONLY CONTINUE TO ADOPT AMERICAN FLAG.—Foreign-built vessels admitted to American registry under the act of August 18, 1914, since our last report, include the steamers *Georgian*, *Maracas*, *Princeton*, and *Somerset;* also the ship *Edna M. Smith*. It is notable that all vessels admitted to American registry under this free ship act average only 3000 tons each, which bears out the prediction that this measure will bring no large modern commerce carriers under our flag, but only the smaller and least desirable vessels that foreign owners would be glad to unload.

In other words, the class of steamers that have been added to American registry are hardly fit for the coastwise trade, with few exceptions.—*Marine Journal*, 12/26.

"THE INTERNATIONAL MIND."—President Butler of Columbia University, in his annual report to the trustees, discusses the need for instruction in international relations, which, as the European war so conclusively demonstrates, has never been more urgent than at this time. "If the world is to progress in harmony, in co-operation and in peace," says Dr. Butler, "the leaders of opinion throughout the world must possess the international mind. They must not see an enemy in every neighbor, but rather a friend and a helper in a common cause. To bring this about implies a long and probably slow process of moral education."

However long and however slow the process may be, Dr. Butler reports that Columbia has made a beginning, "definitely and earnestly," and that this has met with cordial response. The university, it appears, has in a measure become a clearing house for international thought, and there is a likelihood that this will eventually have its effect upon diplomacy, at least to the extent of dispelling ungrounded prejudice.—*N. Y. Evening Sun*, 11/18.

NEUTRALITY DISCUSSED BY REPRESENTATIVES OF SOUTH AMERICAN REPUBLICS AND THE UNITED STATES.—The Governing Board of the Pan-American Union, consisting of the diplomatic representatives of the Latin-American Republic and the Secretary of State of the United States, recently met at Washington to consider the attitude of the American Republics on the question of neutrality in the war.

AGE OF GERMAN GENERALS.—The American Army and Navy officers who have insisted on promotion by selection and by aid of plucking boards in order that young men may reach high commands when still in their prime, will find nothing in the ages of the leading German generals to support their contentions. In the German Army there is no fixed retirement for age applying to all officers, but there is rigid retirement at any time that an officer appears unfit for his position or fails to do well in his duties, or in any way is unable to measure up to the high physical and mental standards of the service. Let an officer be overslaughed in a marked way, and his resignation or application for retirement is tendered forthwith. Never was there, as a whole, more rigid selection—though not wholly uninfluenced by court favor; yet what do we find? General von Emmich, the capturer of Liège, is sixty-six, and General von Kluck is sixty-eight—the one two years and the other four above the compulsory American retiring age. General von Hausen, who has just given up the command of the Saxon Army, because of real or assumed illness, is sixty-eight; General von Heeringen is sixty-four, and General von Einem sixty-one. General von Bülow is also sixty-eight, and General von Moltke, upon whose shoulders rest the heaviest burdens, is sixty-six. Nearly all of these officers are campaigning in France for the second time, having been young ensigns or lieutenants in 1870. General von Hindenburg, whose success on the Russian boundary has made him famous, is sixty-seven. On the English side, Kitchener is sixty-four, Smith-Dorrien fifty-six, Sir John French sixty-two, and General Grierson, who died in France the other day, was fifty-five; while the three French generals, Pau, Joffre, and Gallieni, are all approaching seventy. Plainly, among the generals of this war the Osler theory does not apply, nor the American military belief that you must have middle-aged men for the highest positions.—*The Nation*, 9/24.

SECRETARY GARRISON ON AMERICAN MILITARY PROBLEMS.—It is, of course, not necessary to dwell on the blessings of peace and the horrors of war. . . . . But peace and the other states of being just mentioned are not

always or even often solely within one's control. Those who are thoughtful and have courage face the facts of life, take lessons from experience, and strive by wise conduct to attain the desirable things, and by prevision and precaution to protect and defend them when obtained. . . . .

In the early history of our nation there was a natural, almost inevitable, abhorrence of military force, because it connoted military despotism. Most, if not all, of the early settlers in this country came from nations where a few powerful persons tyrannically imposed their will upon the people by means of military power. . . . . Of course all this has long since passed into history. No reasonable person in this country to-day has the slightest shadow of fear of military despotism, nor of any interference whatever by military force in the conduct of civil affairs. The military and the civil are just as completely and permanently separated in this country as the church and the state are; the subjection of the military to the civil is settled and unchangeable. . . . .

Unless this nation has reached the conclusion that it has no need for the preparation of its military resources . . . . then we must earnestly address ourselves to the question of such proper preparation. I have reached no such conclusion, and in fact am of the firm conviction that no reasonable, prudent man who faces facts could reach such a conclusion. . . . .

Whatever the future may hold in the way of agreements between nations, followed by actual disarmament thereof, of international courts of arbitration, and other greatly-to-be-desired measures to lessen or prevent conflict between nation and nation, we all know that at present these conditions are not existing. We can and will eagerly adapt ourselves to each beneficent development along these lines; but to merely enfeeble ourselves in the meantime would, in my view, be unthinkable folly. By neglecting and refusing to provide ourselves with the necessary means of self-protection and self-defence we could not hasten or in any way favorably influence the ultimate results we desire in these respects.

The Secretary advocates the immediate increase of the enlisted personnel of the army by 25,000 men. This increase would bring up to full strength the existing units of the mobile army in the continental United States; would afford training for the officers in the command of such military units as they must handle in time of war; would prevent, as far as the regular army is concerned, the crowding of the ranks with raw levies in time of national crisis; and would, further, prove a wise investment from the standpoint of economy in that no material increase in overhead charges would be necessary, since the existing physical plant and the administrative organization of the army would not have to be in any way increased to take care of these 25,000 additional soldiers. By means of this increase, Secretary Garrison believes that the army would be in a position to undertake the next necessary step in preparation for national defence—that is, the preparation of a reserve.

He advocates, in this connection, the policy of establishing a system of honorable discharge from the army of those soldiers who have become proficient. Secretary Garrison believes that it matters little whether a recruit enlists for a definite short period or until he has received sufficient training to understand the duties of a soldier, so long as the army is made into a soldier factory rather than a soldier storehouse. Naturally, as Secretary Garrison points out, it is but a logical step from this program to the provision of an adequate reserve of officers and men for our organized militia and the volunteer regiments that would have to be called to the colors in time of war.

Certainly the program laid down by Secretary Garrison is clear, definite, and statesmanlike in its presentation of the problems confronting the army. It is conservative in that it represents the very minimum of the requirements of our national defence.

EXTRACTS FROM THE REPORT OF THE GENERAL BOARD DATED NOVEMBER 17, 1914

Article 167, paragraph 3, United States Navy Regulations, 1913, reads as follows:

"It (the General Board) shall consider the number and types of ships proper to constitute the fleet, the number and rank of officers, and the number and rating of enlisted men required to man them, and shall advise the Secretary of the Navy respecting the estimates therefor (including such increase as may be requisite) to be submitted annually to Congress."

The General Board in compliance with duties thus imposed upon it by this and similar paragraphs in preceding regulations has from year to year recommended to the department a building program and personnel legislation that would, in its opinion, produce a fleet that would be adequate to the needs of the nation.

2. In view of conditions now existing the General Board has given particularly careful thought to its recommendations for the coming fiscal year. To make its position clear and place before the department the full meaning of its recommendations, the General Board considers it necessary to review at length all that has preceded these recommendations and led up to them.

The report continues to make clear the consistent policy of General Board since 1903. Omitting this explanatory analysis the rest of the report reads as follows:

15. The General Board has made a brief analysis (not reproduced here) to set forth clearly the reasons for and meaning of all the recommendations it has made for battleship construction up to this time; and to show the conception under which the General Board has acted in the performance of its duty, under the regulations, as the responsible advisers of the Secretary in all matters relating to the strength of the fleet, and the number and character of the units composing it. In the matter of battleships, the final result of all recommendations, and of all action taken thereon up to this date, has been to produce a completed battle line of 8 units less than the General Board believed to be safe, and with two units less under construction and authorized than was needed to continue the expansion of the fleet to the strength laid down in the policy.

16. The General Board believes the policy it has consistently advocated for the production of an adequate navy is to the best interests of the country, and that any navy less than adequate is an expense to the nation without being a protection. It cannot, therefore, too strongly urge the adoption by the government of a policy looking to the making good of the deficiencies of the past, and the building up of this arm of the national defence until it becomes equal to the task that war will put upon it. That point will not be reached until the navy is strong enough to meet on equal terms the strongest probable adversary.

17. The wisdom of such a policy is well illustrated by recent events, and is reinforced by the teachings of all history. For a review of the history of all ages will show that no nation has ever created and maintained a great over-sea commerce without the support of sea power. It will further show that trade rivalry, which is the active expression of the most universal of all human traits—desire for gain—has been a most fruitful cause of war; and, when the clash has come, the commerce of the weaker sea power has been broken up and driven from the seas. That has been true for all time, and is true to-day; and has a particular bearing on the United States at the present time, when such strenuous efforts are being made to build up a national merchant marine and extend our foreign commerce.

18. In the matter of national defence, history teaches still another great lesson particularly applicable to ourselves. That is, that a nation, insular in character or separated by bodies of water from other nations can and must rely on its navy—when that navy is adequate—for protection and freedom

from invasion and may keep its own soil free from all wars other than civil. The United States is one among the few nations of the world that occupy this happy position, being insular in so far as any nation capable of making serious war upon us is concerned, since any opponent that need be considered must come to us from across the seas. Our main defence and protection from invasion must, therefore, always rest with the navy, which must ever remain our first and best line of defence. This defence, unless adequate, is impotent; and, as before stated, adequacy is not reached until the navy is strong enough to meet on equal terms the navy of the strongest probable adversary.

19. In the matter of battleships the General Board remains of the opinion that it has always held, that command of the sea can only be gained and held by vessels that can take and keep the sea in all times and in all weathers and overcome the strongest enemy vessels that may be brought against them. Other types are valuable and have their particular uses, all of which are indispensable, but limited in character. But, what has been true throughout all naval wars of the past, and what is equally true to-day, is that the backbone of any navy that can command the sea consists of the strongest sea-going, sea-keeping ships of its day, or, of its battleships. The General Board recommends, therefore, in the light of all the information it has up to this present date that the development of the battleship fleet be continued as the primary aim in naval development, and that four (4) of them be authorized in the 1916 program.

DESTROYERS

20. For the general purposes of war on the sea the General Board has placed the destroyer as the type of warship next in importance to the battleship, and has based the programs it has recommended on that idea. After very mature consideration of all the elements involved and a study of the results obtained from fleet maneuvers, the General Board came to the conclusion that a well-balanced fighting fleet, for all the purposes of offence and defence called for a relative proportion of four destroyers to one battleship. Hence, for every battleship built four destroyers should be provided. The General Board still holds this opinion and, therefore, recommends that sixteen (16) destroyers be provided in the 1916 program.

FLEET SUBMARINES

21. For several years past all leading navies have been striving to perfect a submarine of an enlarged type with habitability, radius and speed sufficient to enable it to accompany the fleet and act with it tactically, both in offence and defence. Our designers and builders have been devoting their efforts to the same end and are now ready to guarantee such a type, and one such vessel was provided for in the appropriation act of 1914. The great difficulty in the past in the production of this type has been the lack of a reliable internal combustion engine of the requisite power to give the necessary speed. This difficulty has been overcome, and the General Board is assured that engines have been designed and fully tested that will meet the requirements; and the builders stand ready to guarantee the results. The value of such a type in war for distant work with the fleet can hardly be overestimated, and the General Board recommends that three (3) be provided in the 1916 program. These with the one already authorized, will form a fleet submarine division of four for work with the fleet, and be the beginning of a powerful arm of the fleet.

COAST SUBMARINES

22. For the submarine for coast defence and for occasional acting with the fleet in home waters, the General Board sees no necessity for boats of as great speed and size as the later designs, made before the sea-going sub-

marine was believed to be in sight. In fact, any increase of size is detrimental, in that it increases draft and debars them from shallow waters; and any increase of speed in this class of submarines is not needed, and is gained at the expense of other desirable qualities. Between the coast-defence submarine and the submarine of sufficient size, radius, habitability, and surface speed to accompany and act with the fleet tactically, the General Board sees no necessity in naval warfare for an intermediate type. It is therefore recommended that the submarines for the coast work be of the general characteristics already prescribed in General Board letter No. 420-15, of June 10, 1914, and that sixteen (16) of these be provided for in the 1916 program.

SCOUT CRUISERS

23. In the struggle to build up the purely distinctive fighting ships of the navy—battleships, destroyers and submarines—the cruising and scouting element of the fleet has been neglected in recent years, and no cruisers or scouts have been provided for since 1904, when the *Montana, North Carolina, Birmingham, Chester* and *Salem* were authorized. This leaves the fleet peculiarly lacking in this element so necessary for information in a naval campaign, and of such great value in clearing the sea of torpedo and mining craft, in opening and protecting routes of trade for our own commerce, and in closing and prohibiting such routes to the commerce of the enemy. The General Board believes that this branch of the fleet has been too long neglected and recommends that the construction of this important and necessary type be resumed. For the 1916 program it is recommended that four (4) scout cruisers be provided.

AIR CRAFT

24. The General Board in its endorsement No. 449 of August 30, 1913, and accompanying memorandum brought to the attention of the department the dangerous situation of the country in the lack of air craft and air men in both the naval and military services. A résumé was given in that endorsement with the accompanying memorandum of conditions in the leading countries abroad at that date, showing the preparations being made for air warfare and the use of air craft by both armies and navies, and contrasting their activity with our own inactivity. Certain recommendations were made in the same endorsement looking to the beginning of the establishment of a proper air service for the navy.

25. The total result of that effort was the appointment of a board on aeronautics October 9, 1913. That board made further recommendations, among them the establishment of an aeronautic school and station at Pensacola and the purchase of 50 aeroplanes, 1 fleet dirigible, and 2 small dirigibles for training. At the present time, more than a year later, the total number of air craft of any kind owned by the navy consists of 12 aeroplanes, not more than two of which are of the same type, and all reported to have too little speed and carrying capacity for service work.

26. In view of the advance that has been made in aeronautics during the past year, and the demonstration now being made of the vital importance of a proper air service to both land and sea warfare, our present situation can be described as nothing less than deplorable. As now developed air craft are the eyes of both armies and navies, and it is difficult to place any limit to their offensive possibilities.

27. In our present condition of unpreparedness in contact with any foe possessing a proper air service, our scouting would be blind. We would be without the means of detecting the presence of submarines or mine fields or of attempting direct attack on the enemy from the air, while our own movements would be an open book to him. The General Board cannot too strongly urge that the department's most serious thought be given to this matter, and that immediate steps be taken to remedy it, and recommends

that Congress be asked for an appropriation of at least $5,000,000, to be made available immediately, for the purpose of establishing an efficient air service.

GUNBOATS

28. The navy is very deficient in gunboats. Though the navy list gives 30 names under "gunboats," only a very limited number of these 30 are in a condition to be available for general service. Some, like the *Villalobos, Callao, Samar, Sandoval,* etc., are old boats of little value taken over from Spain, of from 400 to 250 tons and less. Of the others, with the exception of the light-draft river gunboats *Monocacy* and *Palos,* and the *Sacramento,* no gunboats have been authorized since 1902. Seven are at present assigned to naval militia duty, and three others have been recently withdrawn from that service because of the crying need for more gunboats for general duty. Those remaining on the list as serviceable and fit for general duty are so limited in number that it has been necessary in recent years to detail battleships, large cruisers, and destroyers to do gunboat duty. This has been markedly demonstrated during the past year on the Mexican coast. It would seem superfluous to point out the harmful influence this has on the efficiency and training of the fleet for war, and the General Board advises strongly against such practice whenever it can be possibly avoided. It is therefore recommended that a beginning be made to replace the old and worn-out gunboats, that there may be sufficient of them to do the police and general diplomatic duties required of such vessels in time of peace without disrupting the battle fleet. To this end it is recommended that four (4) be authorized in the 1916 program. With the exception of the *Sacramento,* authorized in 1911, no seagoing gunboat has been authorized since 1902.

AUXILIARIES

Fuel Ships

29. In the matter of auxiliaries needed for the fleet the General Board is of the opinion that the most serious situation exists in the matter of fuel-oil supply, and that provision for oil-fuel ships should be given first consideration. This is serious from the point of view of economy in time of peace, and would be disastrous in the event of hostilities arising. We have 41 oil-burning destroyers built or building, to be followed by others, 8 ships of the dreadnought type using oil as an auxiliary fuel, and in 1915 the two first all-oil-fuel battleships will be added to the fleet, to be followed by others. To supply this oil-burning fleet with fuel the navy possesses the *Arethusa,* an old tank ship of 3629 tons capacity and not more than 10 knots speed, and seven fleet colliers fitted to carry some fuel oil in addition. The total oil capacity is 23,728 tons, 3629 tons of which—that in the *Arethusa*—could not accompany the fleet; so that the present available oil supply that could accompany the fleet is 20,109 tons. Logistic studies show that to maintain our present oil-burning fleet in active service across the ocean requires the delivery of about 23,000 tons of fuel oil per month. To maintain this supply we have the seven colliers mentioned above capable of delivering an average of about 10,000 tons per month. This situation will be very much aggravated on the addition to the fleet of the two all-oil-burning battleships, *Oklahoma* and *Nevada,* and the other destroyers now under construction. Nor can commercial oil carriers be relied upon to remedy this deficiency, since ocean tankage both at home and abroad is not yet adequate to meet the demands of commerce and industry.

30. To partially meet this situation two oil-fuel ships of a combined cargo capacity of 15,108 tons were authorized in August, 1912. On November 1, 1914, one of these ships was only 82.4 per cent completed and the other only 57.2 per cent completed.

31. To remedy this serious defect in our preparedness for war the General Board recommended the construction of two (2) oil-fuel ships in the 1915

program. These were not authorized and the General Board therefore emphatically repeats this recommendation for the 1916 program, and further recommends that the construction of the two ships authorized in August, 1912, more than two years ago, be hastened with all possible speed.

Destroyer Tenders and Submarine Tenders

32. The auxiliaries of next importance to the fleet at the present time, after the oil-fuel ships, are destroyer tenders and submarine tenders. Of the three improvised vessels used as destroyer tenders the *Iris*, built in 1885, is past her period of usefulness and should be replaced. The General Board recommended one (1) destroyer tender in the 1915 program. This was not authorized, and the recommendation is repeated for the 1916 program.

33. Of the six vessels used as submarine tenders, all are of the improvised variety, and none are well fitted for the service. Three of them are old monitors, two of them old gunboats, and one the old sailing ship *Severn*. To begin replacing these, one submarine tender was authorized in 1911, another in 1912, and one (1) was recommended in 1913 for the 1915 program. This last was not authorized, and this recommendation is repeated for the 1916 program.

Transports

34. The General Board has from time to time, in numerous letters extending over a series of years, called the attention of the department to the inadequacy of preparation in the navy for advanced base work and to the vital importance of this work to success in war. The prerequisite for any advanced base work is the necessary means for transportation of the personnel and material of the advanced base outfit; and for this reason the General Board has recommended the construction of the two transports needed for the purpose—ships of the size and speed necessary and especially designed for what they were intended to accomplish. Their primary use was to be for war, but secondarily they could be used in general transportation service at all times. Not one of the four improvised transports now in service in the navy—the *Hancock*, *Rainbow*, *Prairie* and *Buffalo*—is of the size, or is fitted, for the work required, nor of the character of construction needed for safety in ships carrying large bodies of men. All are old single-skin ships without proper water-tight subdivision. Of the two transports needed, one was authorized in 1913, and the other recommended in the 1915 program. This was not authorized, and the General Board repeats this recommendation for the 1916 program.

Hospital Ship

35. The General Board in making the foregoing recommendations has given preference to what is needed for the fighting efficiency of the fleet over all other matters. Two other types of auxiliaries, however, are required for the successful administration of the fleet—hospital and supply ships.

36. The two hospital ships now borne on the navy list—the *Solace* and the *Relief*—are both improvised and small, and neither adapted to the service. They have done good service in time of peace in connection with subdivisions of the fleet, but the *Relief* is now unseaworthy and the *Solace* would be of limited value in time of war. To remedy this defect, the General Board recommended the construction of one (1) hospital ship in the 1915 program. This was not authorized, and the General Board repeats this recommendation for the 1916 program.

Supply Ships

37. Of the four ships borne on the navy list as supply ships, all are improvised and were hurriedly bought and fitted in 1898 to meet the exigencies

of the Spanish War. The *Supply* is already beyond her period of usefulness, and has been discarded as a supply ship. The *Culgoa* is approaching her limit of usefulness. The *Celtic* and *Glacier*, while old and inadequately fitted, are still good for some years service. One new ship was authorized in 1913. Another is needed, and to meet this situation the General Board recommended the construction of one (1) supply ship in the 1915 program. This was not authorized, and the General Board repeats this recommendation for the 1916 program.

SUMMARY

38. To summarize, the General Board recommends for the 1916 program—

4 battleships.	2 oil-fuel ships.
16 destroyers.	1 destroyer tender.
3 fleet submarines.	1 submarine tender.
16 coast submarines.	1 navy transport.
4 scouts.	1 hospital ship.
4 gunboats.	1 supply ship.

Air service—$5,000,000.

PERSONNEL

39. The General Board cannot too strongly urge upon the department the necessity of using its best endeavors to carry out the repeated recommendations of the General Board, made from year to year, to provide the fleet with a personnel, active list and trained reserve, equal to the manning of the fleet for war.

40. In the opinion of the General Board this is a matter of even more serious import than that of construction, for it cannot be too often repeated that ships without a *trained* personnel to man and fight them are useless for the purposes of war. The training needed for the purpose is long and arduous, and cannot be done after the outbreak of war. This must have been provided for long previous to the beginning of hostilities; and any ship of the fleet found at the outbreak of war without provision having been made for its manning by officers and men trained for service can be counted as only a useless mass of steel whose existence leads only to a false sense of security.

41. The strength of fleets is measured too often in the public mind by the number and tonnage of its material units. The real strength of a fleet is a combination of its personnel—with their skill and training—and its material; and of these two elements the more important—the personnel—is too often forgotten and neglected in making provision for our fleet. The General Board cannot impress this point too strongly on the department or recommend too earnestly that every effort be made to correct it, and that legislation be urged to provide for a personnel on the active list, supplemented by a trained reserve, sufficient to man every vessel of the fleet when the call comes.

42. No nation in time of peace keeps all the ships of its navy fully manned and in full commission. But all leading nations except ourselves provide an active list, officers and men, sufficient to keep the best of their fleet in full commission and all the serviceable ships of their fleet in a material condition for war; *and in addition a trained reserve of officers and men* sufficient to complete the complements and fully man every serviceable ship of their navies, and furnish a reserve for casualties. Thus, every nation with which conflict is possible is prepared to mobilize its entire navy, by order, with officers and men trained for the service. We alone of the naval powers provide no such reserves, and an active personnel too scant, and trust to the filling of the complements of our ships by untrained men recruited after war is imminent or declared. To quickly man all of the ships of the navy serviceable for war (including ships which are now in reserve or ordinary) with trained crews is impossible owing to the absence of a trained reserve.

43. In view of all that has been herein set forth, the General Board recommends:

(*a*) That legislation be asked for providing an active personnel, officers and enlisted force, capable of keeping in full commission all battleships under 15 years of age from date of authorization, all destroyers and submarines under 12 years of age from authorization, half of the cruisers and all gunboats, and all the necessary auxiliaries that go with the active fleet; and of furnishing nucleus crews for all ships in the navy that would be used in time of war, and the necessary men for the training and other shore stations.

(*b*) That the general policy be adopted of expanding the active personnel with the expansion of the fleet in the proportions indicated in (*a*).

(*c*) That immediate steps be taken to form a national naval reserve of trained officers and men, and that this work be pushed until this reserve in connection with the naval militia has reached the point where, combined with the active list, it will be possible to fully man the entire fleet with war complements and furnish 10 per cent additional for casualties.

(*d*) That the naval militia be expanded in number and that the department encourage the continuance and improvement of its training to the end that it may still more efficiently serve to re-enforce the regular service at need. GEORGE DEWEY.

CURRENT NAVAL AND PROFESSIONAL PAPERS

NOTE.—Lack of space limits the scope of these references. Upon application, members of the Institute will be supplied with fuller references to current periodicals published in both the United States and foreign countries.

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1. THE NORTH AMERICAN REVIEW. **December.**—Germany and the Powers, by *Dr. B. Dernburg*. The Neutrality of Belgium, by *Prof. A. G. De Lapradelle*. The Press in War Time, by *Sydney Brooks*. Switzerland and the War, by *Prof. C. Borgland*. Practical Mediation and International Peace, by *C. H. Sherrill*. **January.**—The Hatching of the War, by *Stephen Phillips*. The War (a British View), by *Sir Oliver Lodge*. War Thoughts, by *T. S. Woolsey*. Latin American Trade Possibilities, by *C. T. Revere*.

2. AMERICAN JOURNAL OF INTERNATIONAL LAW. Editorial: Germany and the Neutrality of Belgium; Germany and International Peace; Our Caribbean Policy. Armed Merchant Ships, by *P. Higgins*. Restrictive Clauses in Arbitration Treaties, by *Amaro Caralcanti*. The Work of the Joint Commission on Panama Claims, by *Prof. Leo S. Rowe*. International Conference on Safety of Life at Sea, by *Everett P. Wheeler*. The Origin of the Hague Arbitral Courts, by *Denys P. Myers*. The International Responsibility of States for Injuries Sustained by Allies on Account of Mob Violence, Insurrection, and Civil War, by *Julius Goebel, Jr.*

3. YALE REVIEW. **January.**—German Economics and the War, by *Prof. H. C. Emery.*

4. SCIENTIFIC AMERICAN. **December 5.**—Rifles and Mortars. Mining and Countermining of Fortifications. Is Germany Self-Sustaining in War? The Military Resources of Turkey. Field Gun and Aerial Projectiles. **January 2.**—Military Tactics and the Mortar. War Experiences of an Air Scout.

5. SHIPPING ILLUSTRATED. **November 14.**—Torpedo Nets. **December 19.**—Submarine Signaling.

6. JOURNAL OF THE UNITED STATES ARTILLERY. **November-December.**—The Development of Coast Artillery Gunnery in the United States During Twenty Years, by *Major James M. Williams, Coast Artillery Corps.* Notes on the Progress of Coast Artillery Gunnery in the United States During the Last Twenty Years, by *Captain Albert L. Rhoades, Coast Artillery Corps.* Suggestions for the Organization of Work in a Large Mine Command, by *Captain Hugh J. B. McElgin, Coast Artillery Corps.* The Hydroaeroplane in Coast Defence Reconnaissance, by *Captain Virginius E. Clark, Aviation Section, Signal Corps.* Parallelism of the Sight-Arm and the Axis of the Bore, by *First Lieutenant Augustus Norton, Coast Artillery Corps.*

7. JOURNAL SOCIETY OF AMERICAN ENGINEERS. **December.**—Problems in Screw Propulsion, by *Captain C. W. Dyson, U. S. N.*, Member. Packing in the U. S. Navy, by *Lieutenant (J. G.) Alex. M. Charlton, U. S. N.*, Member. Organization of the Engineer Division on Board a Man o'War, by *Lieut. Commander A. W. Johnson, U. S. N.*, Member. Test of Newport News Water-Tube Boiler, by *F. P. Palen*, Associate. The Una-Flow Steam Engine, by *A. C. Meyers, B. C. S., Efficiency Engineer*, Member. Stresses in Steam-Balanced Valve Gears, by *Ernest N. Janson*, Member. The Engineer Department of Naval Vessels, compiled by *H. C. Dinger, Lieut. Commander, U. S. N.*, Member.

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8. BLACKWOOD'S MAGAZINE. **December.**—Paris: 1870-1914, by *T. F. Farman.* The First Hundred Thousand, by *The Junior Sub.* Holland and the Scheldt, by *Arthur Page.* India and the War, by *Sir H. Mortimer Durand, G. C. M. G., K. C. S. I., K. C. I. E.*

9. FORTNIGHTLY REVIEW. **December.**—The Blight of Prussian Autocracy, by *Sidney Whitman.* War and Finance, by *J. B. Firth.* The Submarine in War; its Menace and Achievement, by *Archibald Hurd.* Armageddon—and After (III). The War Spirit and Christianity, by *Wilfrid Ward.* Menace in the Near East: 1. Turkey and Egypt, by *Arthur E. P. B. Weigall.* 2. Germany and Turkey, by *J. Ellis Barker.* The Effect of Warfare upon Commerce and Industry: A Retrospect and a Forecast, by *J. B. C. Kershaw.* Germany's Naval Plot in the Mediterranean, by *Nautilus.* The History of the War, Part III, Chapters XX-XXVII, by *E. Temple Thurston.*

10. CONTEMPORARY REVIEW. **December.**—The Downfall of Turkey, by *Dr. E. J. Dillon.* The German Constitutional Movement and the War, by *William Harbutt Dawson.* How to Pay for the War, by *J. E. Allen.* Freeing Six Millions (Jews), by *Gabriel Costa.*

11. THE NINETEENTH CENTURY AND AFTER. **December.**—The Happy Warrior (Roberts), by *Colonel A. Keene, D. S. O.* Ruthless Warfare and Forbidden Methods, by *Sir Thomas Barclay.* The Waste of the War, and the Trade of Tomorrow, by *Yves Guyot.* German "Kultur" from a

Dutch Point of View, by *The Right Rev. Bishop Frodsham.* Tsingtau and its Significance: With Some Impressions from a Recent Visit, by *William Blane.*

12. THE JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION. **November.**—The Battle of Cape St. Vincent. Events in Manila, May-October, 1898, by *Admiral von Diederichs.* Translated from the *Marine Rundschau.* The Use of Submarine Mines as Affected by the VIIIth Hague Convention, by *Lieutenant P. K. Kekewich, R. N.* Translated from the *Rivista Marittima.* The Hohenzollerns. The Royal Naval Reserve, by *Commander W. F. Caborne, C.B., R.N.R.* The War: Its Naval Side. The War: Its Military Side. Appendices I and II. Despatches from Field Marshal Sir John French.

13. UNITED SERVICE MAGAZINE. **November.**—The Navy and the War, by *"Admiral."* Progress in Aeronautics, by *Major H. Bannerman-Phillips.* **December.**—The Navy and the War, by *"Admiral."* Naval Belligerent Rights and Neutral Seaborne Trade, by *A. Wharton Metcalfe, B.Sc.* Our Allies and Our Enemies, Past and Present, by *Lieut. General F. H. Tyrrell.* The Eternal Laws of War, by *Kenelm D. Cotes.* The Swedish Defence Reform, 1914, by *Lieutenant Ture Ström, Royal Upland Artillery.* Anglo-French Relations, by *Major General T. F. Lloyd.* Progress in Aeronautics, by *Major H. Bannerman-Phillips.*

14. INTERNATIONAL MARINE ENGINEERING. **December.**—Launching Calculations, Illustrated, by *G. H. Barber.* New French Battleships, Illustrated.

15. THE ENGINEER. **October 30.**—Hydro-Aeroplane Float Design. **November 27.**—Krupp Guns for Submarines. **December 11.**—An All-Metal Diving Dress.

16. ENGINEERING.—**December 18.**—The War and Engineering. The Limits of Efficiency of Gas Engines.

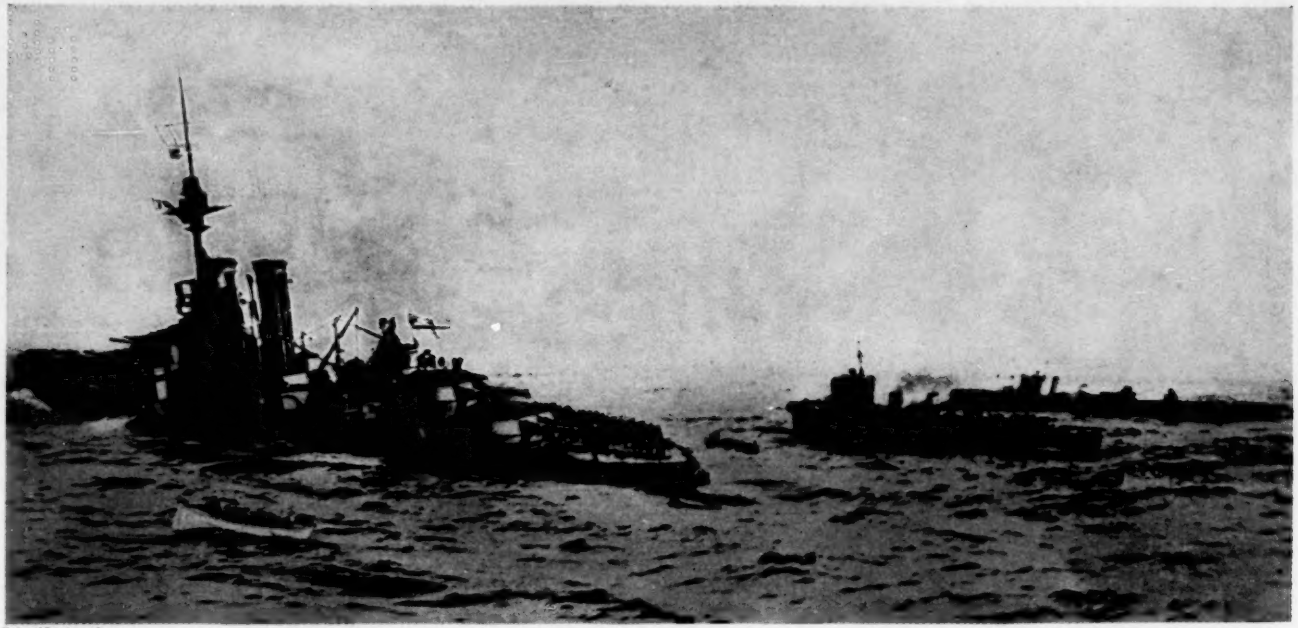
17. THE ENGINEERING MAGAZINE. **December.**—Industrial Results of the European War, by *John B. C. Kershaw.* **January.**—Aviation in Warfare, by *John B. C. Kershaw.* The Corrosion of Iron, by *L. C. Wilson.*

ITALY

18. RIVISTA MARITTIMA. **October.**—Gli avvenimenti navali nel conflitto europeo, by *R. Mazzinghi.* La guerra delle nazioni, by *Illyricus.*

FRANCE

19. REVUE DES DEUX MONDES. **December.**—Le conflit européen, d'après les documens diplomatique, par *M. G. Ferrero.* Nietzsche et la guerre, par *M. L. Bertrand.* La défense du canal maritime allemand, par *M. C. Contre Amiral Degouy.*



Scientific American

SINKING OF THE "AUDACIOUS" BY A MINE OFF THE COAST OF IRELAND.

This view, taken from the deck of the *Olympic*, shows her boats assisting in the rescue of the crew.

EUROPEAN WAR NOTES*

Compiled by LIEUTENANT C. C. GILL, U. S. Navy

GENERAL ARRANGEMENT

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(Details of Land Operations are not included.)

[Events of international significance will be briefly chronicled in large type. Notes and comments bearing upon these events will be interspersed in smaller type. Addenda will be published in future issues to correct and complete this compilation.]

DIPLOMATIC NOTES

The following letter refers to an excerpt printed on page 1554 of the September-October issue:

4, KING'S BENCH WALK, TEMPLE, LONDON, E. C.

The Editor, Journal of U. S. Naval Institute, Annapolis, Md.

Sir.—You reproduced some time ago part of a manifesto by an organization with which I was connected and which existed before the declaration of war. Quotations made from such a manifesto *after* the declaration of war give a somewhat false impression of my attitude. The impression which would I think be left on the mind of the reader would be that I justified, or at least attenuated the criminality of Germany in the violation of Belgian neutrality. I take the view that Germany's action in her attack upon Belgium was a monstrous violation of International Law, and that in so far as Sir Edward Grey's or Great Britain's attitude had for its motive a desire to vindicate that law and fulfil plain obligations it was justified. Whether, if a different policy had been pursued by Great Britain and other nations for some years previous to the war this military action by Great Britain would have been necessary is, of course, another question, and one into which it would be unsuitable for me to enter just now. As to the former point, however, I should be glad if you would allow me to correct any possible misapprehension by according me the few lines of space necessary for what I have written above, especially as it is my privilege to possess a few friends and also readers amongst those whom your journal is likely to reach.

Yours, etc.,

NORMAN ANGELL.

*Acknowledgment is made to A. F. Westcott, Ph. D., Instructor U. S. Naval Academy, for help given in making this compilation.

TURKEY AND THE WAR

On **November 5,** Great Britain declared war on Turkey; and by an Order in Council of the same date annexed the island of Cyprus. The text of the notice:

Owing to hostile acts committed by Turkish forces under German officers, a state of war exists between Great Britain and Turkey as from to-day.

Foreign Office, November 5, 1914.

Following this notice was a proclamation extending to the war with Turkey the proclamations and orders in council now in force relating to the war, other than the order in council of August 4, 1914, with reference to the departure from British ports of enemy vessels which, at the outbreak of hostilities, were in such ports or subsequently entered the same.

The *Gazette* also contained an order in council, dated November 5, annexing the island of Cyprus.

The order, after reciting the convention of June 4, 1878, the annex thereto, and the agreement of August 14, 1878, by which the Sultan of Turkey assigned the Island of Cyprus to be occupied and administered by England, and affirming that by reason of the outbreak of hostilities with Turkey the convention, annex, and agreement have become annulled, asserts that it has seemed expedient to annex the island. His Majesty, with the advice of his Privy Council, has therefore ordered:

From and after the date hereof the said island shall be annexed to and form part of his Majesty's Dominions, and the said island is annexed accordingly.

Thus is another possession added to the far-flung British Empire.—*United Service Gazette,* 11/12.

Extracts from the report of Sir Louis Mallit, British Ambassador to Turkey, dated London, November 20, relating to events preceding his departure November 1:

In pursuance of a long-prepared policy, the greatest pressure was at once exercised by Germany to force Turkey into hostilities. German success in the European War was said to be assured. The perpetual menace to Turkey from Russia might, it was suggested, be averted by a timely alliance with Germany and Austria. Egypt might be recovered for the Empire. India and other Moslem countries represented as groaning under Christian rule might be kindled into a flame of infinite possibilities for the Caliphate of Constantinople. Turkey would emerge from the war the one great power of the East, even as Germany would be the one great power of the West. Such was the substance of German misrepresentations.

It is a matter of common consent that Enver Pasha, dominated by a quasi-Napoleonic ideal, by political Pan-Islamism, and by a conviction of the superiority of the German arms, was from the first a strong partisan of the German alliance. How far his several colleagues and other directing spirits outside the ministry entered into his views is to some extent a matter of speculation; but it may be taken as certain that the Sultan, the Heir Apparent, the Grand Vizier, Djavid Bey, a majority of the ministry, and a considerable section of the Committee of Union and Progress were opposed to so desperate an adventure as war with the Allies. At what moment Talaat Bey, the most powerful civilian in the Cabinet and the most conspicuous of the committee leaders, finally threw in his lot with the war party cannot be ascertained precisely. His sympathies were undoubtedly with them from the beginning, but the part which he actually played in the earlier stages is shrouded in mystery. I have reason to think that for some time he may have thought it possible, by steering a middle course, to postpone a decision until it was clearer what would be the result of the European War;

and he may well have been anxious to gain time and to secure in exchange for Turkey's adhesion to the German cause something more solid than promises. These were tendered, indeed, on a lavish scale, but I am not aware that they were given in a form which could be considered binding. It is certain in any case that Talaat Bey's hesitations were overcome, and that he had definitely joined the conspiracy to bring about war this autumn some three weeks before the crisis was precipitated.

Whatever the views of individual ministers or others may have been, the Turkish Government made no effort to emancipate themselves from German influence or to stem the tide of its progress. The material hold established by the introduction of the two German ships was on the contrary allowed to be strengthened. Not only did these ships remain under effective German control, but a strong German element was imported into the remainder of the fleet, even before the British naval mission, which had been reduced to impotence by order of the Minister of Marine, had been recalled by his Majesty's Government. Large numbers of Germans were imported from Germany as unostentatiously as possible, to be employed in the forts of the Dardanelles and Bosphorus and at other crucial points. Numerous German merchant vessels, of which the most important were the *Corcovado* and the *General,* served as bases of communication and as auxiliaries to what had become, in effect, a German Black Sea Fleet. Secret communications with the German General Staff were established at the outbreak of the war by means of the wireless apparatus of the *Corcovado,* which was anchored opposite the German Embassy at Therapia, and which was continuously used for this among other purposes throughout the whole period under review, in spite of my urgent representations and those of my French and Russian colleagues. Other German ships played with the Turkish flag as they pleased, in order to facilitate their voyages or cloak their real character while in port, and a department was constituted at the German Embassy for the purpose of requisitioning supplies for the use of the German Government and their ships. All these things were tolerated by a complaisant Turkish Government, who appeared to be indifferent to the incessant encroachments on their sovereignty if not to welcome them. . . . .

On the morning of the 29th I received intelligence from Egypt of the incursion into the Sinai peninsula of an armed body of 2000 Bedouins, who had occupied the wells of Magdaba, and whose objective was an attack upon the Suez Canal. . . . .

THE ATTACK ON ODESSA.—The second event of capital importance was the attack on Odessa and other Russian ports in the Black Sea on the morning of the same day, the 29th of October. It is now certain that the actual orders for these attacks were given by the German admiral on the evening of the 27th of October, but it was not until after they had actually taken place, that is, on the afternoon of the 29th of October, when news of the raid on Odessa was telegraphed to me direct by Mr. Consul-General Roberts, that my Russian and French colleagues and myself realized that the die had actually been cast and the crisis that we had so long feared and striven to avert had occurred. . . . .

My interview with the Grand Vizier partly coincided with that of M. de Giers, and preceded that of M. Bompard. It was of a painful description. His Highness convinced me of his sincerity in disclaiming all knowledge of or participation in the events which had led to the rupture, and entreated me to believe that the situation was even now not irretrievable. I replied that the time had passed for assurances. The crisis which I had predicted to his Highness at almost every interview which I had had with him since my return had actually occurred, and unless some adequate satisfaction were immediately given by the dismissal of the German missions, which could alone prevent the recurrence of attempts upon Egyptian territory and attacks on Russia, war with the Allies was inevitable. My Russian colleague had already demanded his passports, and I must, in pursuance of the instruc-

tions I had received, follow the same course. The Grand Vizier again protested that even now he could undo what the war party had done without his knowledge or consent. In reply to the doubt which I expressed as to the means at his disposal, he said that he had on his side moral forces which could not but triumph, and that he meant to fight on to the end. He did not, indeed, hint at a possibility of immediately dismissing the German mission, but he informed me that there was to be a meeting of the council at his house that evening, when he would call upon his colleagues to support him in his determination to avert war with the allied powers.

The council was duly held, and, as he had predicted, the majority of the ministers supported the Grand Vizier, who made a strong appeal in favor of peace, and was seconded by Djavid Bey. But the powerlessness of the Sultan's ministers to do more than vote in the council chamber was evident. The question of dismissing the German naval officers was discussed, but no decision to do so was taken, and no minister ventured even to propose the expulsion of the military mission. In the interval the war party had sealed their résolution to go forward, by publishing a *communiqué* in which it was stated that the first acts of hostility in the Black Sea had come from the Russian side. Untrue and grotesque as it was, this invention succeeded in deceiving many of the public.

It is not possible to establish by proof which of the ministers had preknowledge of the German admiral's *coup*, but it may be regarded as certain that Enver Pasha was aware of it, and highly probable that Talaat Bey was also an accomplice.

EGYPT

On **December 18**, the Ottoman suzerainty over Egypt gave place to a British Protectorate. The Khedive of Egypt, Abbas Hilmi Pasha, who had been in Constantinople several months was formally deposed, and his uncle Prince Hussein Kamel Pasha, was proclaimed Sultan of Egypt.

THE BRITISH PROTECTORATE OVER EGYPT.—The termination of the Turkish suzerainty over Egypt, and the declaration of a British Protectorate, is a purely practical administrative step, dictated by the appearance of Turkey as a combatant. It is not tantamount to annexation, and there are very good reasons why it should not be so. The declaration presumably does not relieve Egypt from the payment of a sum amounting annually to something over £650,000, designated as tribute to Turkey. That money is not directly received by Turkey. It comes to London, and is devoted to the service of two Imperial Ottoman loans secured upon these annual payments. We may further point out that the declaration of a Protectorate does not directly concern the Sudan, where the nominal suzerainty of the Sultan of Turkey was never restored after the reconquest of the Sudan provinces by Anglo-Egyptian forces.—*London Times*, 12/19.

Prince Hussein was born in 1853, was educated in Paris, entered public life in Egypt in 1872, and prior to the abdication of his father in 1878, held important positions in the government administration. Since that time he has interested himself in agricultural matters, the welfare of the fellaheen, and the co-operative movement. A greater antithesis cannot be imagined than that between the deposed and new sovereigns. The latter has been ever friendly to Great Britain, fully understands his country's peculiar position, and is generous to a fault, as the excellent relations existing between him and his tenants testify. The new Sultan is a far abler man than his nephew, and will certainly fill the exalted post with greater dignity and with more benefit to his subjects.—*London Times*, 12/19.

The new Egyptian flag consists of three white crescents with their backs to the staff, each with a five-pointed white star between the horns on a red field. This flag was the personal standard of the Khedive, and now takes the place of the former national flag, which was distinguished from the Turkish by having a star of five instead of six points.—*London Times*, 12/19.

JAPAN.

No pledge of restoration of Kiaochau.

TOKYO, December 9.

The first interpellations in the new session of the Japanese Diet referred to the subject of the return of Kiaochau to China. The opposition asked whether Kiaochau would be returned, whether the government was pledged to China or any other power in the matter of the final disposal of the territory, and whether the clause in the Japanese ultimatum to Germany referring to the final restitution of Kiaochau to China did not bind the action of Japan.

Baron Kato, the Minister for Foreign Affairs, replied that the question regarding the future disposal of Kiaochau could not at present be answered, but it could be definitely stated that Japan had never committed herself to any foreign power on this point. "The purpose of the ultimatum," he continued, "was to take Kiaochau from Germany and so restore peace in the Orient. The restriction of Kiaochau after a campaign was not thought of, nor was it referred to in the ultimatum."—*Reuter, London Times*, 12/10.

In reply to a question as to his views with regard to the "Japanese" problem, Admiral von Tirpitz observed:

That is a problem for the Americans. They will have to give it their attention. Then we shall look on. When I say that we shall only look on, I am of course joking. That would depend entirely upon the circumstances —upon circumstances. . . . . I can assure you of one thing; Germany will never be a traitor to the white race. Japan will make China her vassal and will make a military people out of China's millions. Then your country (the United States) will have to be on its guard. Admiral Togo once said to a European: "The next war will be a general European war, and after that will come the great war between my race and yours."

Admiral von Tirpitz admitted that the fall of Tsingtau had been a heavy blow for him. He could not explain himself the apparent indifference of America in presence of the activity of Japan in the Pacific, or the apparent inability of America to recognize the serious complications which might arise for her in the very near future. In his opinion, no one could be misled by the announcement that Japan intended to leave to Australia the islands in the Pacific.—*London Times*, 12/24.

The following extract from the *Peiching Jih Pao*, or *Pekin Daily News*, blames Great Britain for the violation of Chinese neutrality and for bringing the war to Chinese soil:

An Anglo-Japanese force is bombarding Tsingtau and panic prevails over part of Shantung province, so that the cry of the crane and the moaning of the wind are mistaken for the tramp of the enemy. Towns distant from the German leased territory are exposed to havoc and hardly a house enjoys tranquillity. The foreign office protests, the state council has addressed interpellations to the president, and the press rages. The nation knows too well the dire distress of our fellow-countrymen and feels fierce resentment for the injustice. It is quite certain that the government will compel redress sooner or later, so that these miseries will not have been in vain. The war in Europe had no relation to the Far East, but ambitious powers wilfully transplanted it to Chinese soil. . . . .

Japan not Responsible.—Will Britain explain her motive in inflicting the horror of war upon us? Japan pleads the exigencies of the alliance with

Britain as her excuse for attacking Tsingtau. Japan boasts herself the England of the East. British troops are marching with Japanese upon Tsingtau; if the latter loot, the British are responsible; if they outrage and rape our women, Britain is responsible. Japan's anti-German spirit is fostered by Britain; the latter and not Japan is the ringleader. Because Britain hates Germany, China is innocently involved. Hence our losses must be made good by Britain and not Japan; we may doubtless count on Britain's paying the reckoning after the conclusion of peace! The question of our obtaining compensation does not depend on the issue of the war. If Germany and Austria win, the Allies will have to pay us directly, while if the latter win the day, Germany and Austria will have to pay them an indemnity, out of which our compensation will come. . . . .—*London Times*, 12/15.

Both in France and England the advisability of seeking the aid of Japanese troops on the Continent has been favorably considered.

In the November *Contemporary Review*, and again in the December number, Dr. E. J. Dillon advocates this course. He writes: "I possess no first-hand knowledge as to how the Tokyo Government would respond to a request of this nature, but I have been assured by some whose opinion carries weight that the project is workable. It will hardly be gainsaid that five hundred thousand thoroughly trained Japanese soldiers would turn the scale at the present conjuncture. It seems equally true that no hesitation should be felt about inviting them over, provided that the scheme is feasible. If these assumptions be correct, the sooner negotiations on the subject are opened the better."—*Contemporary Review*, November.

M. Georges Clemenceau, in *L'Homme Enchaine*, favors the same project; and M. Andre Cheradame, a French author and journalist, takes up the subject in *L'Illustration*.

"M. Cheradame figures that intervention by Japan would shorten the war by three months and save the Allies a billion francs ($200,000,000) a month. A loan could be made to Japan which Germany would eventually have to pay as an indemnity. Participation in a European war would enhance Japan's world prestige. The Mikado's Government recognizes this point, but it is possible that the Japanese people do not view it in the same light.

"M. Cheradame then discusses the objections to bringing Japanese troops to Europe and dismisses as unworthy of argument the idea that there would be anything humiliating about it.

"The writer then considers the possibility of the United States objecting to Japanese troops coming to Europe to participate in the war. This is a point which all other writers on this subject have steadily avoided, although it is understood here that England's dislike to Japanese intervention is greatly due to a desire not to offend the United States.

"After pointing out that the Monroe Doctrine, which prevented European nations from intervening in Mexico, puts the United States out of court as an objector, M. Cheradame says Japanese intervention would be of real advantage to the United States in hastening the re-establishment of peace and in giving Japan territorial and financial advantages which would obviate the necessity of emigration from that country, from which troubles in California have arisen.

"*Trade for U. S.*—It would result also in the complete defeat of Germany and allow the United States to capture part of the trade formerly held by that country. This would serve the United States infinitely better than the concentration of Japanese economic activity in the Far East.

"The writer does not advocate the bringing of a Japanese army to France, but would like to see the Japanese troops used for a new attacking

front on south Germany by sending them to Bavaria, Wurttemberg and Baden. This plan assumes that Rumania will join the Allies soon and Greece will follow afterward. This would allow the Japanese access to Europe via Salonica. He argues that 400,000 Japanese troops could be brought to Galicia by the trans-Siberian Railway and 400,000 more by sea to Salonica within four months."—*N. Y. Sun*, 1/4.

ITALY

On **December 24**, Italy landed a naval force at the Albanian port of Avlona, with the announced purpose of maintaining the independence and integrity of Albania as agreed upon at the conference of London.

The war gave to Italy the opportunity to establish her influence in Albania, which Austrian jealousy had denied her, and following the resolution which ended in the ignominious departure of William of Wied, Essad Pasha, her protégé, established himself, as they say in Mexico, as "provisional president" in the region around Durazzo.

It is a revolt against Essad, fostered apparently by the not very intelligent diplomacy of Austria and by Turkish emissaries preaching a holy war, that has led to Italy's present intervention. As we write no protest has been received from the powers, who a short time ago undertook to settle the destinies of the unfortunate Albanian nation, but now are occupied with other matters, and it appears probable that Italy will remain in unmolested occupation of Avlona, if she so chooses, for the duration of the war. At any rate, it is unlikely that a protest, unless of the most formal kind, will be heard from Austria, as any serious attempt to interfere with the liberty of Italian action in Albania at this time would almost certainly result in adding her to the enemies of the Teutonic Alliance. How delicate the position of Italy was regarded as being even two days before the Avlona incident was reflected in the insurance rates quoted at Lloyds, which were thirty guineas per cent against war between Italy and Austria, Germany and Turkey within one month, and fifty guineas per cent against war within six months.—*Nation*, 12/31.

ROME, January 4.

It is announced here officially that the Albanian rebels attacking Durazzo yesterday sent into the city a letter signed "Moslem Committee," demanding the surrender of the French and Servian envoys.

After midnight the attack upon the city was delivered. Essad Pasha notified the Italian Legation that danger was imminent and invoked Italian aid.

At half past two o'clock the Italian warships *Misurata* and *Sardegna* opened fire on the city's defences and silenced the rebel rifle fire directed on the Italian colony.

The staffs of the Italian and French and Servian legations have taken refuge on board the warships.—*New York Sun*, 1/5.

SCANDINAVIA

During the last week in December, Gustav V of Sweden, Haakon VII of Norway, and Christian X of Denmark met at Malmö, in southwestern Sweden, with the object of securing the concerted action of their respective states in relation to the war.

Mr. H. A. Larsen, in an article entitled *Scandinavia and the War* (*Outlook*, December 2), points out that the significant fact in the foreign relations of Russia and Sweden is fear of Russia, Sweden naturally looks to

Germany for support against such aggression, and feels, furthermore, that the weakening of Germany might threaten her own existence. The integrity of Norway is guaranteed for ten years by the Integrity Treaty of 1907, signed by England, Germany, France and Russia. Norway has in the past looked to England as her especial protector, but realizes that the present relations of England and Russia might weaken such support.

As regards Denmark, "the seizure of Schleswig-Holstein has enabled Germany to build the Kiel Canal, affording a quick passage from the Baltic to the North Sea without the necessity of navigating the difficult Sound between Denmark and Sweden. The strategic importance of Denmark to Germany is hereby lessened, since the little kingdom no longer holds the only key to the Baltic.

"To England the day may come when her squadron must enter the Baltic, and there is no way except through the Sounds, which the Danes have blocked by submarine mines. Only a narrow passage in the Oresund is left free, and the Danish Government provides pilots free of charge to all merchant vessels. To provide a battleship with a pilot would, of course, be a violation of neutrality, and the action of Denmark is therefore a virtual, though not a formal, prohibition. According to private advices, lacking official confirmation, it was the result of an ultimatum from Germany which gave Denmark the choice between laying mines in her waters or having the Germans lay them. Denmark chose to do it herself.

"In all three countries the conviction has gained ground that neutrality is no easy loophole out of difficulties, but that it may involve heavy sacrifices. The campaign for military preparedness has been most vigorous in Sweden, where the Asiatic explorer Sven Hedin issued his first passionate 'Word of Warning' in 1912. Since then he has carried on a ceaseless agitation, trying to rouse his countrymen with his flaming oratory to see the danger from the East and prepare for the coming struggle. Others have taken up the call, and last February the movement culminated in that remarkable demonstration known as the 'Yeomen's March.' Thirty thousand landowners from all parts of Sweden met in Stockholm and marched under their old provincial banners to the royal castle to meet the king face to face and offer him their worldly goods in defence of the fatherland. Seventy thousand additional names were signed to the address that was handed the king. One group of citizens after another—scientists, artists, and business men—hastened to offer their support. More than three thousand university students, their white-capped, singing crowds 'like the onward rush of spring floods,' went to the king to assure him of their willingness to meet the demands of a lengthened military service. It was a time of visitation such as may not come to a people once in centuries. It has shown tangible results in the action of the Riksdag, which recently appropriated money for adding eight battleships to the navy, for extending the time of compulsory military service to one year with especial regard to the winter training of the soldiers, and in other ways strengthening the defences of the country. The example of Sweden will probably be followed in Norway."—*Outlook*, 12/2.

NAVAL NOTES

Naval developments in the following strategic areas will be considered separately and in turn:

1. NORTH AND BALTIC SEAS.
2. MEDITERRANEAN AND BLACK SEAS.
3. THE FAR EAST.
4. THE PACIFIC.
5. THE ATLANTIC.

BELLIGERENTS' WAR LOSSES

(On the left margin of this table of losses is a page reference to Naval Institute War Notes.)

LOSSES OF BRITAIN AND HER ALLIES

BRITISH WARSHIP LOSSES

PAGE	NAME	CLASS	TONNAGE	HOW LOST
245, 1874	Audacious	dreadnought	25,000	By mine.
247	Bulwark	battleship	15,000	Internal explosion.
1863	Aboukir	armored cruiser	12,200	By Submarine U-9.
1863	Hogue	armored cruiser	12,200	By Submarine U-9.
1863	Cressy	armored cruiser	12,200	By Submarine U-9.
271, 1886	Monmouth	armored cruiser	9,800	By gun fire.
271, 1886	Good Hope	armored cruiser	14,100	By gun fire.
1583	Warrior	protected cruiser	13,550	By mine.
249	Hermes	protected cruiser	5,600	By mine.
	Gloucester	light cruiser	4,900	By mine.
	Fearless	light cruiser	3,500	By mine.
253	Pathfinder	light cruiser	3,000	By Submarine U-21.
	Arethusa	light cruiser	3,520	By mine.
1583	Pegasus	light cruiser	2,135	By gun fire while dismantled.
1567	Amphion	scout cruiser	3,500	By mine.
1867	Hawke	unarmored cruiser	7,800	By Submarine U-9.
	Druid	torpedoboat destroyer	770	By mine.
	Laertes	destroyer	——	By mine.
	Phoenix	destroyer	770	By mine.
1583	Speedy	destroyer	800	By mine.
247, 1873	D-5	submarine	600	By mine.
1871	E-3	submarine	810	By mine.
	E-1	submarine	800	Foundered in Australia.
	Fishguard II	training ship	——	Foundered in North Sea.
250, 1873	Niger	torpedo gunboat	210	Sunk by submarine.
	Mary	mine sweeper	——	By mine.
	Name unknown	mine sweeper	——	By mine.
	Name unknown	collier	——	By mine.
1874	Oceanic	troop ship	17,274	Accidentally rammed.
	Formidable	battleship	15,000	

FRENCH WARSHIP LOSSES

	Monsquet	torpedoboat destroyer	——	Torpedoed by Emden.
	Name unknown	torpedoboat	——	Sunk in collision.
	Name unknown	torpedoboat	——	Sunk in collision.

RUSSIAN WARSHIP LOSSES

267	Jemtchug	cruiser	3,050	Torpedoed by Emden.
	Pallada	cruiser	7,775	By German submarine.

JAPANESE WARSHIP LOSSES

1878	Takatschio	old armored cruiser	3,700	By mine.
	Shirotaji	torpedoboat destroyer	380	Wrecked.
	Name unknown	torpedoboat	——	By mine.
	Torpedoboat 33	——	——	By mine while dredging.

LOSSES OF GERMANY AND HER ALLIES

GERMAN WARSHIP LOSSES

276	Gneisenau	armored cruiser	11,600	By gun fire.
276	Scharnhorst	armored cruiser	11,600	By gun fire.
247	Yorck	armored cruiser	9,350	By mine.
258	Friedrich Karl	armored cruiser	8,858	By mine in Baltic.
1566	Augsburg	protected cruiser	4,280	By gun fire.
1566	Magdeburg	protected cruiser	4,478	By gun fire.
1569, 1856	Mainz	protected cruiser	4,280	By gun fire.
1569, 1856	Koeln	protected cruiser	4,280	By gun fire.
1569, 1856	Ariadne	protected cruiser	2,620	By gun fire.
270	Koenigsberg	protected cruiser	3,400	Fled, bottled up in East Africa.
262, 1880	Emden	third class cruiser	3,600	By gun fire.
276	Leipzig	light cruiser	3,250	By gun fire.
276	Nürnberg	light cruiser	3,450	By gun fire.

PAGE	NAME	CLASS	TONNAGE	HOW LOST
1871, 1861	Hela	small cruiser	2,000	By submarine.
	Kormoran	small cruiser	1,630	By gun fire, China.
283	Geier	small cruiser	1,630	Interned.
1584	Cap Trafalgar	auxiliary cruiser	26,000	By gun fire.
1578	Kaiser Wilhelm der Grosse	auxiliary cruiser	14,349	By gun fire.
252	Berlin	converted cruiser	17,324	Interned in Norway.
	Patagonia	converted cruiser	——	Seized by Argentina—violation of neutrality.
282	Cormorant	converted cruiser	6,000	Interned at Guam.
	V-186	destroyer	750	By gun fire.
1860	V-187	destroyer	750	By gun fire.
	S-106	destroyer	675	By gun fire.
1878	S-90	destroyer	400	Ran ashore and destroyed.
1869	S-115	destroyer	420	By gun fire.
1869	S-117	destroyer	420	By gun fire.
1869	S-118	destroyer	420	By gun fire.
1869	S-119	destroyer	420	By gun fire.
1861	S-126	destroyer	420	Rammed.
250	S-124	destroyer	350	Accidentally rammed by Danish steamer.
	Panther	gunboat	900	By gun fire.
270	Iltis	river gunboat	900	By gun fire, China.
270	Luchs	river gunboat	900	By gun fire, China.
270	Tiger	river gunboat	900	By gun fire, China.
270	Jaguar	river gunboat	900	By gun fire, China.
	Soden	converted gunboat	——	Captured off Cameroon River.
250	U-18	submarine	750	Rammed by patrol boat.
	Name unknown.	submarine	——	By gun fire.
	Name unknown.	submarine	——	By gun fire.
	U-15	submarine	250	Rammed by British torpedo-boat.
	Name unknown.	minelayer	——	Captured by French.
1566	Koenigin Luise	minelayer	1,800	By submarine.
	Markomannia	supply ship for Emden	——	Sunk by gun fire.
	One supply ship.	————	——	By gun fire.
	One supply ship.	————	——	Captured.
	Name unknown.	2 colliers of Admiral von Spee		Captured.
	Exford	collier to Emden	——	Captured.
	Moene	survey ship	650	By gun fire.
1885	Komet	old destroyer	——	Captured.
	Planet	survey ship	650	By gun fire.
	Locksun	naval tender	——	Interned.
	Karnac	auxiliary transport	——	Interned in Chile.

AUSTRIAN WARSHIP LOSSES

270	Kais'n Elizabeth	protected cruiser	4,060	By mine in China.
	Beethoven	converted cruiser for training		By mine.
1574	Zenta	light cruiser	2,300	By gun fire from French ship.
	Name unknown.	torpedoboat	——	Sunk by mine.
	Name unknown.	torpedoboat	——	Sunk by mine in Adriatic.
	Name unknown.	torpedoboat	——	Sunk by mine in Adriatic.
	Name unknown.	submarine	——	By gun fire from French cruiser.

TURKISH WARSHIP LOSSES

260	Messudiyeh	battleship	10,000	Sunk by British submarine.
	Three transports with troops		——	Sunk by Russian warships.
	Name unknown.	gunboat	——	By mine near Dardanelles.

Very few official statements have appeared from the German navy officials concerning losses, and there have been very few from the French, Russians, Austrians or Turks. In the losses of warships of all classes Germany has lost 56; Great Britain, 29; Japan, 4; France, 3; Russia, 2; Austria, 7 and Turkey, 4.

It is interesting to note that twenty-seven of the German warships have been sent to the bottom by British gunfire and five by Japanese gunfire. Only two British warships have been sunk by German gunfire in battle, and one British cruiser lying at a dock in India, dismantled and helpless, was practically destroyed by gunfire of the German warship *Emden*.

Two German warships have been sunk by British submarines, and one Turkish, while German submarines have sent six British warships to the bottom of the sea, and one Russian warship.

Of the 105 war vessels of all nations lost the submarines have in just short of five months of war destroyed only eight of them. Fifteen of the twenty-seven British ships lost have been sunk by mines, and so far as known only three German warships have met their fate by mines. The German cruiser *Emden* sailing under false colors managed to torpedo and sink one French and one Russian warship.

A study of the table will show that the great majority of losses were from gunfire and mines. The Germans have thus far relied upon mines and submarines, for the most part, while the British sucesses in the majority of cases have been achieved in open battle with gunfire.—*Army and Navy Journal.*

GERMAN SHIPS AT LARGE

BATTLE CRUISER

	Tonnage	Built	Men
Goeben	22,600	1911	...

UNARMORED CRUISERS

Dresden	3,544	1908	348
Karlsruhe	4,850	1913	373
Breslau	4,500	1911	165

The *Breslau* and the *Goeben,* although nominally sold to Turkey, are regarded by the Allies as German to all intents.

NORTH AND BALTIC SEAS

BRITISH SHIPS IN HOME WATERS

12 super-dreadnought battleships. (3 were due for completion this year and are probably now in commission.)
11 dreadnought battleships.
7 dreadnought battle cruisers.
37 pre-dreadnought battleships.
27 armored cruisers.
22 light cruisers.
41 protected cruisers.
198 destroyers.
89 torpedo-boats.
70 submarines.
7 mine layers.
3 repair ships.

GERMAN SHIPS IN HOME WATERS

16 dreadnoughts.
4 battle cruisers.
24 pre-dreadnoughts.
9 armored cruisers.
30 light cruisers.
151 destroyers.
43 torpedo-boats.
38 submarines.

RUSSIAN SHIPS IN BALTIC WATERS

4 pre-dreadnought battleships.
13 armored and protected cruisers.
2 light cruisers.
80 destroyers.
24 submarines.

THE LOSS OF THE "AUDACIOUS"

(See Photo, p. 234)

Fully two weeks before the loss became known to the public, the British dreadnought *Audacious,* one of the four ships of the *King George V* class, struck a mine off the north coast of Ireland, and went to the bottom.

This disaster came as a sequel to the warning cabled over at about the time when the loss occurred, that the northerly coast of Ireland had been mined, and shipping, using this trade route, should keep outside of certain specified waters.

That the *Audacious* was sunk by a mine, and not by a submarine, is suggested by the announcement, recently made by Premier Asquith in the House of Commons, that the British Government had decided to declare the whole of the North Sea to be in the military area. In this connection he said: "In the last week of October the Germans succeeded in laying a mine field off the north coast of Ireland, on the main trade route from America to Liverpool via the north of Ireland. Merchant ships were blown up and lost. . . . . The menace to peaceful shipping presented by these wholly illegal methods of waging war is so great that the government has been compelled to adopt the only possible means of protection, namely, to declare the whole North Sea a military area, and to restrict all shipping crossing it to a narrow passage, along which the strictest supervision can be maintained."

The sinking of the *Audacious* is by far the most serious loss yet sustained by any of the naval powers engaged—in fact, in its bearing upon the actual fighting strength of the British Navy it is equal to the sum of all the losses previously suffered. For the *Audacious* was a capital or first-line ship, one of those major units which must line up against the enemy in that supreme and decisive engagement (if it ever takes place) when the German battleship fleet emerges to fight it out to a finish in a great fleet action. The crew were saved; but this noble ship, representing a cost of from $12,000,000 to $13,000,000, is a total loss.

And yet, so vast is the British Navy, and so great is its shipbuilding capacity, that in spite of the loss of the *Audacious*, the dreadnought fleet still numbers 30 ships, and by the first of next month will number 32 ships, the 23,000-ton, 21½-knot *Audacious* being replaced by the 27,500-ton, 25-knot *Queen Elizabeth* and *Warspite*. These are ships of vastly greater power, mounting the new 15-inch gun in place of the 13.5-inch gun carried by the *Audacious*. Moreover, by the first of March, three additional ships of the *Queen Elizabeth* class will be completed, thus raising the total dreadnought strength of the British to 35 ships, as against 31 at the opening of the war.

Because of the menace of mines and submarines, the British battleship fleets are probably gathered at certain bases on the North Sea coasts of England and Scotland, where they are thoroughly protected by mine fields. Here they are in touch with the scouts, protected cruisers, destroyers, etc., which are patrolling the German coasts and the entrance to the Baltic, ready to flash the news to the main fleet, should the Germans attempt a sortie.

How then, it will be asked, did it happen that the *Audacious* was on the northerly coast of Ireland, and what was she doing there, so far from the North Sea blockade. The answer is to be found in the necessity for keeping the gunners tuned up to their work by target practice. Target practice must be done in the open sea, and involves steaming over considerable distances. Obviously the submarine-infested waters of the North Sea, mine-strewn as they are, involved too great a risk; and hence, the Admiralty selected for practice grounds, waters remote from the North Sea.

Lough Swilly, near which the disaster occurred, is a naval base, and the *Audacious*, at the time of the accident, was about twenty miles off shore, and was just turning to make her run past the target. She is stated to have been in squadron formation with four other ships. From this we infer that the ships have been sent away from the North Sea, a squadron at a time, for battle practice in supposedly safe waters.

The fact that the *Audacious* was struck aft on the port quarter, near the engine-room, has led to the suggestion that the blow was that of a torpedo, fired from a submarine—this for the supposed reason that, if a ship runs against a mine, she must necessarily strike it head on and be damaged in the forward portion of the hull. But the ship was turning to make the run past the target. This turn is made with the helm well over, and under these

conditions the ship pivots sharply about her stem, the stern swinging over to port or starboard (to port in this case). There is a marked lateral movement of the ship during the turn, and the bow might clear a mine which the after portion of the ship would override. This is what happened to the *Audacious.*—*Scientific American,* 11/28.

LOSS OF "YORCK" AND "D 5"

November 3.

Early this morning an enemy's squadron fired on the *Halcyon,* a coast-guard gunboat engaged in patrolling, with the result that one man was wounded. The *Halcyon* having reported the presence of these vessels, various naval movements were made, as a result of which the enemy retreated rapidly, and although shadowed by the light cruisers they could not be brought to action before dusk.

The rearmost German cruiser, in retirement, threw out a number of mines, and submarine *D 5* was sunk by exploding one of these. Two officers and two men who were on the bridge of the submarine, which was running on the surface, were saved.—*Admiralty Announcement.*

AMSTERDAM, November 5, 2.20 a. m.

The following official telegram has been received from Berlin:

The German cruiser *Yorck* yesterday forenoon struck the chain of mines blocking the entrance to Jahde Bay and sank.

The latest reports say that up to the present 382 men—more than half the crew—have been saved. The work of rescue has been rendered more difficult by a thick fog.

(Signed) P. BEHNICKE,
Captain and Departmental Chief of the Naval Headquarters Staff.

COURT-MARTIAL ON THE LOSS OF THE "YORCK"

COPENHAGEN, December 27.

The *Hamburger Echo* states, on the authority of the *Norddeutsches Volksblatt,* that a court-martial was held at Wilhelmshaven on December 23 on the sinking by a mine of the cruiser *Yorck,* with a loss of over 300 men. Captain Pieper, for disobedience to an order and negligence occasioning the loss of the ship and homicide through negligence (*fahrlässig Tötung*), was sentenced to two years' detention in a fortress, and Commander Cleve to one year's imprisonment.—*London Times,* 12/28.

LOSS OF THE PRE-DREADNOUGHT "BULWARK."—Early in the morning of November 26 the British pre-dreadnought *Bulwark* was blown up in Sheerness Harbor in the Thames at a point about thirty-five miles from London. Practically the whole of the ship's complement of 750 men was lost, the ship going down within three minutes after the explosion and only fourteen of the crew being saved.

Of the three possible causes of her loss—a mine, submarine attack, or an internal explosion—the last named has been generally accepted as the most probable. No mine-laying by the enemy would be possible at a point so far up the estuary which leads to Great Britain's most important city. In view of the fact that the Thames is heavily mined it would be impossible for a submarine of the ordinary type to have made its way so far up the river; moreover, the fact that the Germans have made no claim to the destruction of the *Bulwark* coupled with the other difficulties above mentioned, leads to the conclusion that the ship was lost through the explosion of her magazine.

Even if this theory be adopted, the loss of the ship is still shrouded with mystery; for although the *Bulwark* was an old battleship, her design having been gotten out some sixteen years ago, we understand that in the matter of powder inspection and the safeguards to preserve the magazines at an even temperature, the ship was thoroughly up-to-date.

It is true that the French Navy lost one of its finest battleships, the *Liberté*, through the deterioration and spontaneous combustion of its powder; but it has since developed that the powder aboard the *Liberté* was of inferior and unstable quality and not comparable in point of safety with the powder carried by the British Navy, which for many years past has proved to be thoroughly stable and reliable. In commenting upon the disaster, Lord Charles Beresford said: "It is certain that the magazine must have exploded, but I cannot imagine how it happened. Good cordite does not explode without a detonator, and inferior cordite is excluded by frequent tests. There was a fire a while ago within the magazine of the battleship *Revenge*. Sailors quenched it and the magazine did not explode. The magazine of the *Bulwark* was in a very safe position and was protected by every modern device. Possibly a shell or fuse was dropped, but even this ought not to have exploded the magazine."

The *Bulwark* was a pre-dreadnought of early design, she and her sisters, the *London* and *Venerable*, having been laid down in 1898 to 1899. She was of 15,000 tons displacement and could make 18½ knots. Her protection was very light for a battleship, the belt being only 9 inches thick amidships. Her battery consisted of four of the old 40-caliber 12-inch guns and twelve 45-caliber 6-inch, and she carried four 18-inch submerged torpedo tubes.

The loss of this ship does not sensibly affect the strength of the first fighting line of the British Navy—a fact which will be readily appreciated when we compare her fighting efficiency with that of the *Audacious*, a thoroughly modern dreadnought, recently lost off the Irish coast. The *Bulwark* in a single broadside fired a weight of 2 tons metal; the broadside of the *Audacious* weighed 6⅓ tons. The total energy of the *Bulwark's* broadside, including the 12-inch and 6-inch guns, was 186,000 foot-tons, whereas the *Audacious* fired a broadside of 646,500 foot-tons. The 40-caliber 12-inch guns of the *Bulwark* could penetrate 16 inches of armor at 5000 yards; but at the same range the 13½-inch guns of the *Audacious* could pass through 22 inches of armor. The 12-inch shell of the *Bulwark* weighed 850 pounds; the 13½-inch shell of the *Audacious* weighed 1250 pounds, and because of the fact that it contained a far heavier charge of high explosive, the shell had enormously greater destructive power.—*Scientific American*, 12/12.

THE "BULWARK" DISASTER.—The *Bulwark* disaster, which from the first has never been attributed to any agency of the enemy, has called to mind the care and attention that has always been exercised in the magazines and shell-rooms of the British Navy to prevent explosions in these compartments. Directly after the blowing up of a French battleship in drydock at a government yard on the other side of the Channel, the British authorities made the most searching investigations in respect to their own naval propellant, since the accident in France was traced to the unreliability, under certain conditions, of the famous "Powder B" of our cross-Channel neighbors. These investigations eventually led to thousands of tons of our own cordite of that period being jettisoned, or otherwise destroyed, and the introduction of an improved and more severe system of periodic tests of all "lots" of cordite in our naval magazines, both on board ship and at our large storage depots ashore. No outlay was spared to secure absolute safety, very expensive cooling apparatus to keep down the temperature in ships' magazines being introduced by the Admiralty and installed on board all ships where the propellants were stored in such a position as to be subjected to great heat when the boilers were being stoked and a full head of steam used. The *Bulwark* was one of the ships to be thus treated, and this makes any explosion in the main magazine all the less understandable, if that is what really happened.—*United Service Gazette*, 12/10.

FINDINGS OF COURT OF INQUIRY.—The official court of inquiry into the destruction of the British battleship *Bulwark* in the harbor of Sheerness,

thirty-five miles from London, on November 26, found that the loss of the vessel was due to accidental ignition of the ammunition. No evidence was gathered suggesting treachery or a hostile attack by submarines. The loss in lives was 801, only fourteen of the ship's company being saved. This is the first accident of this nature in the British Navy. In other countries the *Aquidaban* (Brazil), *Maine* (United States), *Mikasa*, Japan, and *Iena* and *Liberte* (France), were lost from similar causes. It was stated in some papers at the time the *Bulwark* blew up that one of the shells which were being hoisted in from a powder lighter alongside slipped from its slings and exploded in the magazine. This view was disproved by the inquiry. The nose of a 12-inch projectile is protected by a safety cap tested to an impact equivalent to twenty tons upon the square inch. It would, therefore, require a velocity of several times the force of its gravity to break this down. The theory of fulminating powder accidentally coming into contact with cordite and setting up spontaneous ignition is regarded by naval men as the most likely explanation of this catastrophe.—*Shipping Illustrated*, 12/19.

The naval port of Wilhelmshaven is situated on Jahde Bay, which is on the German coast between the rivers Weser and Ems. The *Yorck*, which was an armored cruiser of 9350 tons, was built at Hamburg in 1904. Her armament consisted of four 8.2-inch guns, ten 6.9-inch guns, fourteen 3.4-inch guns, and four submerged torpedo tubes. She carried a crew of 616 officers and men and her speed was 21 knots.

It is concluded that the *Yorck* was one of the vessels which fired on the *Halcyon* and that in attempting to get back to Wilhelmshaven she "found" a German mine which put a stop to her career.—*United Service Gazette*, 10/12.

"HERMES" TORPEDOED.—The following was issued from the Press Bureau on October 31.

The Secretary of the Admiralty states that the old cruiser Hermes, which had been recently used as a seaplane-carrying ship, was sunk to-day by a torpedo fired by a German submarine in the Straits of Dover as she was returning from Dunkirk. Nearly all the officers and crew were saved. The loss of the vessel is of small military significance.

A flotilla of destroyers and several tugs were immediately despatched from Dover, and shortly after noon the first batch of the rescued men were brought into Dover naval harbor by a destroyer, and landed.

The men stated that the disaster occurred about 9 in the morning, the *Hermes* being struck by two torpedoes. One struck the ship's quarter and the other tore a gaping rent in the bottom of the ship. The first torpedo, it is said, put her propellers out of action, making her a helpless target for the second torpedo, which blew the ship up in the vicinity of the engine-room. Accounts varied as to how long the cruiser kept afloat, some being of opinion that it was about an hour, whilst others put it at far less. Fortunately a destroyer and other vessels were soon on the scene, and nearly 400 were saved.

Fleet Surgeon Mowat gave some particulars of the foundering of the ship. He said most of the officers were sitting in the wardroom. Wind, sea, and rain were very rough. All at once plates flew about in all directions. The officers rushed up on deck and were told that a submarine had attacked them on the starboard side. Dr. Mowat said the impact shivered the ship from stem to stern. There was no panic whatever. The men came sharply up to command.

The *Hermes* was one of a type of three second-class cruisers provided for in the estimates of 1896-97. She was a steel vessel, sheathed and coppered, with three funnels fore and aft and two masts. Her length was 350 feet, beam 54 feet, and draft 20 feet 6 inches. The displacement of the vessels of the class is 5600 tons, and with a horse-power of 10,000 at natural

draft they steamed at 20 knots. The armament comprises eleven 6-inch, nine 12-pr., eight 12-cwt., one 8-cwt., six 3-pr., and six .45-in. Maxim guns, and two torpedo tubes. The *Hermes* carried seven 18-inch torpedoes. Her complement was 437. The *Hermes'* sister ships are the *Highflyer* and *Hyacinth.*

Warrant Engineer Edmund Bowden, of the *Hermes,* said that he saw the second torpedo coming towards the *Hermes* one hundred yards away. Seeing the torpedo about to strike he shouted a warning, and many men ran forward and escaped injury. When it struck the stern of the vessel heaved up and iron fragments flew like hail. The vessel floated for two hours. Two French and three or four British destroyers came to the rescue, and the submarines sheered off. There was no panic. The first torpedo would not have sunk the *Hermes,* but the second had a terrific effect.—*Naval and Military Record,* 11/4.

"NIGER" TORPEDOED BY SUBMARINE.—Of the 96 officers and men in the twenty-two-year-old gunboat *Niger* all were accounted for, which shows that although the vessel went down altogether in 15 minutes there was no panic on board. The men were at dinner when they heard an order given to close the watertight doors, and a few seconds later there was an explosion, the vessel being struck under the forebridge. Lieut. Commander Muir states that he saw the torpedo which struck the ship. But as she was at anchor there could have been no means of avoiding it. The men were quietly mustered, and some got into the boats which pluckily rowed out from Deal to the scene.—*Army and Navy Gazette.*

GERMAN TORPEDO-BOAT "S 124" NEARLY CUT IN TWO BY STEAMER COPENHAGEN.

Early in the morning of November 23 the Danish steamer *Anglo-Dane,* belonging to the United Steamship Company, and bound from Stettin to Copenhagen, collided at the southern entrance to the Sound with German torpedo-boat *S 124.*

The torpedo-boat was carrying no lights, and was thus unobserved.

The *Anglo-Dane* cut half-way through the the torpedo-boat between the funnels, and the boiler immediately exploded.

The *S 124* sank, but two other German torpedo-boats arrived and rescued her crew. Three of them, severely wounded, including the chief engineer, were taken on board the *Anglo-Dane* and conveyed to Copenhagen, but two died before reaching the harbor.—*Central News.*—*Naval and Military Record,* 11/25.

BRITISH DESTROYER WRECKED.—A British torpedo-boat destroyer went ashore early December 27, 1914, on the coast of Kingsbarns, Scotland, six miles southeast of St. Andrews. Her crew was saved by lifeboats. The destroyer was steaming south from Aberdeen to the Firth of Forth and in the darkness and without shore lights lost her bearings.

GERMAN SUBMARINE "U 18" RAMMED.—The Secretary of the Admiralty states that the German submarine *U 18* was reported on the northern coast of Scotland Monday morning.

At 12.20 a British patrolling vessel reported having rammed her. She was not sighted again until 1.20, when she was seen on the surface, crew on deck, and flying the white flag.

Shortly after this she foundered, just as the destroyer *Garry* came alongside and rescued three officers and 23 of her crew, one only being drowned.

The *U 18,* completed in 1912, had a displacement of 650 tons (750 tons when submerged). With a horse-power of 1400 and 500, she had a speed of 14 knots on the surface and of 8 knots submerged. Her maximum radius was 2000 miles, and, like the majority of the latest German submarines, had underwater signalling apparatus and sleeping accommodation for her crew.—*Naval and Military Record,* 11/25.

GERMAN SUBMARINE RAMMED BY FRENCH TORPEDO-BOAT.—A French torpedo-boat entered the port of Dunkirk, slightly damaged from the effects of having rammed a German submarine in the bay of Westende. The enemy's ship had tried to torpedo the French boat, but the French commander had seen the submarine's periscope, and putting on all steam he had rammed the enemy's craft, and reported she had been sunk. The submarine sank without rising to the surface. Although search was made, no trace of the lost vessel or its occupants has been found. It is admittedly difficult to ascertain whether a submarine which dives after being struck has not done so of her own accord. Even if oil is seen on the surface, it may only be that the double bottom has been fractured, but not severely.—*Army and Navy Gazette*, 11/21.

A GERMAN SUBMARINE'S ESCAPE.—It was reported that the destroyer *Badger* had succeeded in ramming a German submarine, suffering in the process comparatively little injury. The destroyer struck the enemy ship a smart blow with her bow, which, in consequence, was considerably crumpled up. The officers and men assumed that, as the submarine disappeared, she had been sunk. A few days later the German wireless admitted that the submarine had been rammed by the *Badger*, but added that she had safely returned to port. There is reason to believe that this statement is accurate, and the German designers deserve full credit for the justification of the policy which they adopted a few years before the war began. No explanation was ever issued, but it was known that it had been decided to fit the later submarines with a double skin, so as break the force of impact if rammed. The presumption is that the technical advisers of the Marine Amt at Berlin studied the reports issued from time to time of British craft which had been sunk or endangered by being rammed, and they adopted this expedient as a precautionary measure. They have the satisfaction of knowing that their ingenious contrivance saved at least one German submarine from going to the bottom. The vessel, it may be assumed, had her outer skin considerably damaged, but her stability was maintained, and, her machinery being uninjured, she was able to return to port.—*Naval and Military Record*, 11/4.

BOMBARDING ZEEBRUGGE.—The fleet has been actively engaged in bombarding the coast off Ostend with satisfactory results:

ADMIRALTY, November 25.

On November 23 all points of military significance in Zeebrugge were subjected to a severe bombardment by two British battleships. The German opposition was feeble. The extent of the damage is not known. The British ships returned safely.—*United Service Gazette*, 12/3.

NAVAL OPERATIONS OFF BELGIAN COAST.—What was officially termed "a fine flotilla of vessels very suitable for this work, in shallow water off Belgian coast, but at the same time not of great naval value," was got together and placed under the command of a young but experienced and capable flag officer, Rear Admiral the Hon. H. L. A. Hood. The name of such units in his command as have been disclosed show that destroyers, gunboats, sloops, and other small craft, mounting powerful long-range guns, have been employed, and that French vessels have been co-operating also. Material assistance has been rendered by the naval aircraft and balloons in spotting the fall of the shells and transmitting intelligence regarding the ranges. Effective support was given to the small craft by the battleships which first came into action on the morning of October 27. Details of the havoc wrought in the enemy's lines, and especially against his heavy guns by the *Venerable*, which is officially stated to have been engaged in this work, have already been made known, and the results of their work must be said to be highly creditable to the British officers and men and a tribute to their skill and marksmanship. This week the naval operations off the

Belgian coast have been advanced another and equally important stage by the bombardment of Zeebrugge. There has been some pardonable exaggeration of the value of this place as a "naval base," but the destruction of military works there must undoubtedly be highly disconcerting to the enemy. That submarines had been taken there and preparations made for refuelling and provisioning them seems obvious, and whether they came here in sections by rail or under their own motive power from Emden they must have been destroyed by the bombardment of the docks. Thus the operations off the Belgian coast have assumed a naval as well as a military significance. Practically the whole of the coast right up to the Dutch frontier has been made untenable to the Germans, and the way has been prepared for the advancement of the Allied Army.

These operations and others in the Channel illustrate the difficulty there is in dealing with submarines. Exactly when these boats first made their appearance in the Channel is not stated, but it would seem from the announcement made on October 2, when mines were laid in the southern portion of the North Sea, that they must have been active before that. Their activity naturally placed our seamen on the alert, and it is creditable that with so many ships moving about over so many weeks only three successes have been scored by the submarines. One of these, moreover, was a merchant ship, the *Amiral Ganteaume*, which is authoritatively stated now to have been sunk by a torpedo and not by an accident as was first assumed. The naval ships which fell victims to submarine attack were the *Hermes* and *Niger*, both old vessels, and whatever the precautions taken, it is clear that they both presented easy targets, and their destruction should not be without its warnings. This submarine warfare must be expected to continue, but as the German boats are decreased—and one, if not two, have gone this week, *U 18* having been sunk and *U 17* damaged—it ought to become less annoying.

In a message despatched on Tuesday, the *Daily Mail* correspondent stated that the Solvay works near the Bruges ship canal were a heap of ruins. The sections of six submarines which had been brought there have been reduced to twisted iron and a large quantity of stores has been destroyed. From two till five on Monday afternoon shells were rained on the town. In less than an hour the coastguard building and the public school were destroyed. The military trains at the Solvay works were blown to fragments, and a large crane which was being used for putting the submarines together simply disappeared. Earlier in the day the fleet bombarded the coast from Middelkerke northwards to the Dutch frontier, clearing the dunes of the Germans' advanced right wing. For several weeks the enemy had been reported to be collecting stores and fortifying Zeebrugge in the hope of making it a naval base. While the ships engaged in the bombardment have not been made known, it may be conjectured that they were under the direction of Admiral Hood, whose flotilla has now completed six weeks valuable work off the Belgian coast.—*The Army and Navy Gazette*, 11/28.

"BERLIN'S" INTERNMENT.—The German auxiliary cruiser *Berlin* was interned at Drontheim after the boilers had been damaged, there being no other alternative for the captain but to run into that port, and to relinquish the right to leave within 24 hours. The damage to the boilers had reduced the speed of the vessel to eight knots. The officers will be set free on parole. The crew remain on board the ship. Drontheim is a naval harbor guarded by fortifications provided with powerful searchlights.—*Shipping Illustrated*, 12/12.

The Norwegian authorities have been somewhat perturbed at the apparent ease with which the German auxiliary cruiser *Berlin* arrived inside the Trondhjem Fiord without being observed. A court-martial sat to inquire how it was that the *Berlin* had managed to pass the forts at Agdenes and the observation stations at the narrowest part of the

Fiord, where the passage is only 3000 yards wide. It was proved that the *Berlin*, with incredible daring, had passed without Norwegian assistance at midnight during a snow squall, utilizing the services of a private German pilot. The *Morning Post* correspondent stated that the snowstorm was sufficiently thick not to allow the use of the searchlights from the fortifications. A more effective watch service is now to be established, and several guardships are anchored outside Trondhjem Fiord. The *Berlin* is said to have been intended as much for minelaying and for provisioning German submarines off the smaller uninhabited islands on the Norwegian coast as for commerce raiding, and it is quite possible that another ship may attempt to succeed where she has failed.—*Army and Navy Gazette*, 11/28.

SUBMARINE ACTIVITY.—On the authority of the Copenhagen correspondent of the *Central News*, it is stated that the submarine which sank the steamer *Malachite* in the Channel on November 23 was *U 21*. This is the first of the large-type German vessels, according to the text-books, and is the one which sank the *Pathfinder*. On November 25 *U 21* is said to have been discovered by two destroyers, at whom she fired two torpedoes. She made good her escape, and on the 26th sank the steamer *Primo* off Havre.—*Army and Navy Gazette*, 12/12.

NORTH SEA CLOSED

LONDON, November 2.

The Secretary of the Admiralty makes the following announcement:

During the last week the Germans have scattered mines indiscriminately in the open sea on the main trade route from America to Liverpool via the north of Ireland. Peaceful merchant ships have already been blown up with loss of life by this agency. The Whit Star liner *Olympic* escaped disaster by pure good luck. But for the warnings given by British cruisers other British and neutral merchant and passenger vessels would have been destroyed.

These mines cannot have been laid by any German ship of war. They have been laid by some merchant vessel flying a neutral flag, which has come along the trade route as if for purposes of peaceful commerce, and while profiting to the full by the immunity enjoyed by neutral merchant ships, has wantonly and recklessly endangered the lives of all who travel on the sea, regardless of whether they are friend or foe, civilian or military in character.

Minelaying under a neutral flag, and reconnaissance conducted by trawlers, hospital ships, and neutral vessels are the ordinary features of German naval warfare.

In these circumstances, having regard to the great interests entrusted to the British Navy, to the safety of peaceful commerce on the high seas, and to the maintenance within the limits of international law of trade between neutral countries, the Admiralty feel it necessary to adopt exceptional measures appropriate to the novel conditions under which this war is being waged.

They therefore give notice that the whole of the North Sea must be considered a military area. Within this area merchant shipping of all kinds, traders of all countries, fishing craft, and all other vessels will be exposed to the gravest dangers from mines which it has been necessary to lay and from warships searching vigilantly by night and day for suspicious craft. All merchant and fishing vessels of every description are hereby warned of dangers they encounter by entering this area except in strict accordance with Admiralty directions.

Every effort will be made to convey this warning to neutral countries and to vessels on the sea, but from the 5th of November onwards the Admiralty announce that all ships passing a line drawn from the northern point of the Hebrides through the Faroe Islands to Iceland do so at their own peril.

Ships of all countries wishing to trade to and from Norway, the Baltic, Denmark, and Holland are advised to come, if inward bound, by the English Channel and the Straits of Dover. There they will be given sailing directions which will pass them safely, as far as Great Britain is concerned, up the east coast of England to the Faroe Islands, whence a safe route will, if possible, be given to Lindesnaes Lighthouse. From this point they should turn north or south according to their destination, keeping as near the coast as possible. The converse applies to vessels outward bound.

By strict adherence to these routes commerce of all countries will be able to reach its destination in safety, so far as Great Britain is concerned, but any straying, even for a few miles, from the course thus indicated may be followed by fatal consequences.—*Naval and Military Record*, 11/4.

GERMAN CRUISER RAID ON YORKSHIRE COAST

THE ADMIRALTY, December 16.

This morning a German cruiser force made a demonstration upon the Yorkshire coast, in the course of which they shelled Hartlepool, Whitby, and Scarborough.

A number of their fastest ships were employed for this purpose, and they remained about an hour on the coast.

They were engaged by the patrol vessels on the spot.

As soon as the presence of the enemy was reported a British patrolling squadron endeavored to cut them off.

On being sighted by British vessels the Germans retired at full speed, and, favored by the mist, succeeded in making good their escape.

The losses on both sides are small, but full reports have not yet been received.

The Admiralty take the opportunity of pointing out that demonstrations of this kind against unfortified towns or commercial ports, though not difficult to accomplish provided that a certain amount of risk is accepted, are devoid of military significance.

They may cause some loss of life among the civil population, and some damage to private property, which is much to be regretted, but they must not in any circumstances be allowed to modify the general naval policy which is being pursued.

This was followed by an intimation from the War Office.

11.35 p. m.

At 8 a. m. to-day, three enemy ships were sighted off Hartlepool, and at 8.15 they commenced a bombardment.

The ships appeared to be two battle cruisers and one armored cruiser.

The land batteries replied, and are reported to have hit and damaged the enemy.

At 8.50 the firing ceased, and the enemy steamed away.

None of our guns were touched.

One shell fell in the Royal Engineers' lines, and several in the lines of the 18th Service Battalion of the Durham Light Infantry.

The casualties amongst the troops amounted to seven killed and fourteen wounded.

Some damage was done to the town, and the gas works were set on fire.

During the bombardment, especially in West Hartlepool, the people crowded in the streets, and approximately 22 were killed and 50 wounded.

At the same time a battle cruiser and an armored cruiser appeared off Scarborough and fired about fifty shots, which caused considerable damage, and thirteen casualties are reported.

At Whitby two battle cruisers fired some shots, doing damage to buildings, and the following casualties are reported, viz., two killed and two wounded.

At all three places there was an entire absence of panic, and the demeanor of the people was everything that could be desired.

Later information shows that nearly 100 civilians were killed, and nearly 500 wounded in the three towns.

The raiding vessels are reported to have returned safely, but British destroyers attempted to intercept them, the outcome of their attack being the following casualties:

H. M. S. (?), 4 killed, 4 wounded.
H. M. S. *Doon*, 2 killed, 2 wounded.
H. M. S. *Hardy*, 2 killed, 14 wounded.
Army losses comprised 14 soldiers killed and 20 wounded.

—*United Service Gazette*, 12/24.

INQUEST VERDICTS.—At the inquest on the Scarborough victims, held on December 18, Mr. Arthur Dean, Chief Officer of Coastguard at Scarborough, said that the weather was very thick and hazy, and it was only at times that the vessels—two large cruisers and two small ones outside covering the larger ones—could be made out. He saw no flags flying, and there was no national ensign on any cruiser. The ships opened fire with all guns on the starboard side, and kept firing as they passed along the bay. Afterwards they turned and fired from the port side. "There have been," said Mr. Dean, "conflicting reports about the distance the ships were away. They varied from two miles to eight miles. As a matter of fact, when they first attacked they were within 800 yards of the Castle," and he thought that "when they were going past the pier they were within 500 yards." Asked as to the shells fired witness said they were of all classes. There was nothing that he saw to make the ships go away. From the number of guns the ships were using, he would say fifty shells were fired at the Castle first, and 250 shells, large and small, in the first firing. Then there was a lull, the ships turned round, and 250 larger shells were fired. He should say at least 500 shells were fired. The jury returned verdicts of "Killed by bombardment" in the cases before them. At the inquests at Hartlepool on December 18 and 19, the verdicts were that "The deceased were killed in time of war by shell fire from German warships off the coast of the Hartlepools."

GERMAN ACCOUNTS.—The official description in Germany of the raid was as follows:

"When approaching the English coast our cruisers were unsuccessfully attacked by four British destroyers in misty weather. One destroyer was sunk and two others disappeared in a badly damaged condition. The batteries at Hartlepool were silenced, and the gas works destroyed. Several detonations were heard, and three big fires in the town could be observed from our ships. The coastguard station and the waterworks at Scarborough, and the coastguard station and signal station at Whitby, were destroyed. Our ships received some shots from the coast batteries, but suffered only slight damage. In another place another British destroyer was sunk." (Signed) VON BEHNCKE.

Count Reventlow, according to a *Daily Telegraph* translation, says:

We desire to deal with the contention of the British Admiralty that the German ships bombarded open coastal towns. To this we must remark that Hartlepool and Scarborough are fortified, while Whitby is a coast signal station and a coastguard station, besides which it possesses a harbor always available for naval purposes. Article 2 of the ninth convention of The Hague Conference in 1907 reads as follows: The prohibition respecting the bombardment of undefended harbors, towns, etc., by naval forces does not apply to "military works, military or naval depôts, stores of weapons or war material, workshops or plant which may be of use to the enemy fleet or army, nor to warships lying in harbor."

A coastguard station and a signal station are military and naval establishments; at Whitby they are probably amplified by barracks, etc. A harbor may be made to serve the needs of the enemy fleet, and hence the harbor works and the signal station can be bombarded in complete accord with the international regulations. It is regrettable that civilians and non-military buildings should have been hit, but this cannot be avoided. It

is the case in every fortress. The English air-bombs in the Rhineland have also struck civilians. Hence the British Admiralty should be more sparing of this sort of language, and might also remember the French bomb-throwing on the unfortified German town of Freiburg.—*Army and Navy Gazette*, 12/26.

THE RAIDING VESSELS.—Difficult as it is, however, to bring to action a hostile force which, aided by the weather, is anxious to avoid an engagement, the Admiralty's announcement shows that this was nearly accomplished, and probably would have been, but for the classes of vessels used by the enemy.

From Mr. Churchill's letter to the mayor of Scarborough, from the descriptions of the numbers and appearance of the vessels, and from the discovery of 12-inch shells which failed to explode, it is clear that all the German battle cruisers in home waters were sent on this errand. They are the *Derfflinger, Seydlitz, Moltke, Von der Tann,* and *Blücher,* of which the first-named has 12-inch, the next three 11-inch, and the last-named 8.2-inch guns in their primary batteries. It has also been conjectured that the *Luetzow* may have been present, but this vessel was only begun in September, 1912, and launched in November, 1913, so that if already completed she must have been built in little more than two years, or in a period from six to twelve months shorter than her predecessors. The composition of the squadron which came to Yarmouth, Gorleston, and Lowestoft on November 3, was never definitely settled, but a Swiss paper, *La Guerre Mondiale,* says that it included the *Moltke, Von der Tann, Blücher, Colberg, Strassburg,* and *Graudenz,* that is to say, three battle cruisers and three new light cruisers.—*Army and Navy Gazette*, 12/26.

BRITISH RAID CUXHAVEN NAVAL BASE.—The Secretary of the Admiralty makes the following announcement:

On Friday December 25, German warships lying in Schillig roads off Cuxhaven were attacked by seven naval seaplanes.

The attack was delivered at daylight, starting from a point in the vicinity of Heligoland. The seaplanes were escorted by a light cruiser and destroyer force, together with submarines.

As soon as these ships were seen by the Germans from Heligoland, two *Zeppelins,* three or four hostile seaplanes, and several hostile submarines attacked them. It was necessary for the British ships to remain in the neighborhood in order to pick up the returning airmen and a novel combat ensued between the most modern cruisers on the one hand and the enemy's aircraft and submarines on the other.

By swift maneuvering the enemy's submarines were avoided and the two *Zeppelins* were easily put to flight by the guns of the *Undaunted* and *Arethusa.*

The enemy's seaplanes succeeded in dropping their bombs near to our ships, though without hitting any.

The British ships remained for three hours off the enemy's coast without being molested by any surface vessel and safely re-embarked three out of the seven airmen with their machines. Three other pilots who returned later were picked up, according to arrangement, by British submarines which were standing by, their machines being sunk.

Six out of the seven pilots therefore returned safely. Flight Commander Francis E. T. Hewlett, R. N., is, however, missing. His machine was seen in a wrecked condition about eight miles from Heligoland and the fate of this daring and skilful pilot is at present unknown. The extent of the damage by the British airmen's bombs cannot be estimated, but all were discharged on points of military significance.—*London Times,* 12/28.

Flight Commander Hewlett was picked up in the sea at the mouth of the Vecht, by a steam trawler and landed there. He was leading the airship squadron in the raid when he ran into a thick fog, and after a time found

himself near the coast of Schleswig. He flew over German territory and eventually came near Cuxhaven. When the mist had cleared he saw that he had lost his direction. He descended at a certain point, ascended again and flew over the great German fleet and the trawlers which were lying under steam behind Heligoland. "A formidable fire was directed at me," says Lieutenant Hewlett in an interview, "and I replied with several bombs. It is my opinion that I hit one of the German vessels, because soon afterward dense smoke arose from her. I was unable to find the British fleet. My motor was running hot and I was compelled to descend. I was picked up by a Dutch trawler, but I destroyed my motor and sank the hydroplane before I boarded the trawler, at ten o'clock on Christmas morning. I stayed aboard the trawler six days during a terrible storm."—*Army and Navy Journal*, 1/9.

THE CUXHAVEN RAID.—The composite British force of cruisers, destroyers, submarines and aeroplanes that raided Cuxhaven on Christmas day may not have done much damage, but the operation, aside from the audacity of it, seems to have been the most instructive of the war. Consider this one statement in the British Admiralty report: "The two *Zeppelins* were easily put to flight by the guns of the *Undaunted* and *Arethusa*." It was worth while undertaking the affair to learn that the *Zeppelins* would not stand gunfire at a height from which they could drop bombs to cripple or destroy a warship.

Of interest fully as great was the demonstration of the offensive power of a flotilla of aeroplanes. No less than seven of these machines took part in the raid, discharging bombs "at points of military significance," presumably at the German warships and defences of Cuxhaven. The Admiralty is in ignorance of the damage done, but the important thing is that the British naval aviators proved their ability to make an attack in force. Three of their machines were, however, abandoned in the water and one aviator was unaccounted for. But aeroplanes are being turned out rapidly in England. The cost is comparatively light. If the war goes on for another year raids by aviators, with the support of fast cruisers and torpedo-boats, will surely become an important feature.

Speed in maneuvering, it has been held, is the best protection against the submarine's torpedo. Such was the theory before the war. The success of the British cruisers *Arethusa* and *Undaunted*, which have a speed of 30 knots, in evading the enemy's submarines proves the soundness of the theory. The British destroyers and submarines engaged in the operation did not, of course, afford the same target, and these types can usually take care of themselves. As the British combination of units remained off Cuxhaven for three hours the Germans had an excellent opportunity to engage and destroy the British cruisers by using both aircraft and submarines. The attempt was made but failed.—*New York Sun*, 12/29.

GERMAN AEROPLANES RAID DUNKIRK.—As if in reply to the raid on Cuxhaven by British seaplanes, a German squadron of aeroplanes made an attack on Dunkirk. Four machines flew over the town and dropped bombs, while a fifth hovered in the distance. Fifteen persons are known to have been killed and thirty-two wounded.—*Army and Navy Gazette*, 1/2.

MINE DISASTERS.—A survey of events shows that through mine disasters Sweden has already lost eight ships and fifty to sixty lives, Denmark six vessels and six lives, Norway five vessels and six lives, and Holland three vessels and fifteen lives. It is estimated that the loss to Sweden of these vessels and their cargo will amount to over £500,000.—*The Engineer*, 12/18.

BALTIC

THE LIBAU BOMBARDMENT.—The second bombardment of Libau by the Germans sank some ships in the entrances to the port. This will not have come as a surprise to those who have followed the trend of events. To

block the Russian ships in Libau would not only place a portion of Admiral von Essen's force at a disadvantage for taking the offensive, or, indeed, acting in any capacity on a sudden emergency, but it would relieve the German ships watching the port. Obstacles such as sunken ships would not necessarily be permanent; they could be blown up. But the point is that this operation would take time, and during the delay opportunity would be given to the enemy to collect his forces and have them ready by the time a passage was cleared.—*Army and Navy Gazette*, 11/28.

"HERTHA" AND A GERMAN MINELAYER SUNK.—The Russian Admiralty received information December 26 that the German cruiser *Hertha* and a German minelayer had been sunk in the Baltic. In the absence of further information it is believed by the Admiralty officials that the *Hertha* was protecting the minelayer while the latter was operating along the Russian coast and that she was overtaken by a Russian cruiser. The *Hertha* was a protected cruiser launched in 1897, and was reconstructed in 1907. She displaced 5791 tons and had a speed of 19 knots. Her armament comprised two 8.2-inch, six 5.9-inch and eight 3.4-inch guns and three torpedo tubes. She had a complement of 473 officers and men.

"FRIEDRICH KARL" SUNK.

PETROGRAD, December 17.

It is officially announced that the German armored cruiser *Friedrich Karl* has been sunk with the loss of two-thirds of her crew, only 200 men being saved. It is not stated when, where, or in what circumstances she was lost, but it is intimated that it was the result of a brilliant exploit on the part of the Russian coast defences.

According to a Reuter message the *Friedrich Karl* was sunk during the last sortie in the Baltic.

The *Friedrich Karl* was an armored cruiser of nearly 9000 tons. She was commissioned in 1902 and had a speed of 20 knots. She carried four 8.2, ten 5.9, and fourteen 3.4-inch guns. Her complement was about 550.—*London Times*, 12/18.

THE SEPTEMBER NAVAL ACTION IN THE BALTIC.—During September a report was circulated that several German warships had been badly damaged by Russian vessels in the Baltic, but no confirmatory news was received of any action until last week, when it was stated that the disaster to the German Navy was the outcome of a very smart piece of naval work by the Russian Baltic fleet, commanded by Admiral von Essen. The German vessels, it seems, had acquired the habit of cruising about the Baltic up to the limit which the Russian fleet had decided to hold, and were doubtless putting severe pressure upon Sweden. Receiving certain information Admiral von Essen painted several of his cruisers and destroyers with the German colors, and contrived in foggy weather to join the German ships unsuspected. At a convenient moment he opened fire, sank one German cruiser, and badly damaged another, while the destroyers put in good work on the German smaller craft. After this the Russian vessels went home again untouched.—*United Service Gazette*, 12/3.

MEDITERRANEAN AND BLACK SEAS

The naval powers are represented in the Mediterranean as follows:

FRANCE

4 dreadnoughts.
18 pre-dreadnoughts.
(All carry 12-inch guns.)
20 armored and protected cruisers.
11 light cruisers.
(Several of these were abroad at the opening of the war.)
84 destroyers.
153 torpedo-boats.
(Most of these are small and probably suitable only for harbor defence work.)
70 submarines.

GREAT BRITAIN

3 battle cruisers.
4 armored cruisers.
16 destroyers and depot ships.
2 gunboats.
6 submarines.
(3 at Malta; 3 at Gibraltar.)
16 torpedo-boats.

AUSTRIA-HUNGARY

3 dreadnoughts.
(Only the dreadnoughts and 3 of the pre-dreadnoughts are armed with 12-inch guns. The others carry 9.4-inch weapons.)
12 pre-dreadnoughts.
2 armored cruisers.
12 light cruisers.
(Including 3 nearing completion at the outbreak of the war.)
19 destroyers.
11 submarines.
58 torpedo-boats.
(These torpedo-boats are only 200 tons or smaller; armed for the most part with 3-pounders.)

BLACK SEA FLEETS

TURCO-GERMAN

BATTLE CRUISER

Launched	Name	Displacement	Armament
1911	Goeben	23,640	10 11-in. 12 6-in.

BATTLESHIPS

Launched	Name	Displacement	Armament
1891	Torgut-Reia	9,901	6 11-in. 8 4-in.
1891	Kheyr-ed Din		

CRUISERS

Launched	Name	Displacement	Armament
1911	Breslau	4,500	12 4.1-in.
1903	Hamidieh	3,800	2 6-in. 8 4.7-in.
1903	Medjidch		

10 destroyers.
7 torpedo-boats.
12 gunboats.

RUSSIAN

BATTLESHIPS

Launched	Name	Displacement	Armament
1906	Ioann Ziztoust	12,733	4 12-in. 4 8-in. 12 6-in.
1906	Evestafi		
1900	Pateleimon	12,582	4 12-in. 16 6-in.
1896	Rostislav	9,000	4 10-in. 8 6-in.
1893	Tri-Sviatitelia	12,500	4 12-in. 10 6-in.

CRUISERS

Launched	Name	Displacement	Armament
1902	Raul	6,675	12 6-in. 12 3-in.
1903	Pomyat Mercuria		

20 destroyers.
4 torpedo-boats.
10 submarines.

—*Naval and Military Record*, 11/11.

BERLIN REPORTS FRENCH "COURBET" SUNK.

BERLIN, via wireless to SAYVILLE, L. I.

The Official Press Bureau gave out the following statement to-day:

"Vienna reports state that it has been ascertained that the French dreadnought *Courbet* was hit by the Austrian submarine *No. 12*. The *Courbet* was rammed by her sister ship, the *Jean Bart*, which was attempting to tow her. The *Courbet* sank. The *Jean Bart* docked at Malta.

"The French pretend that only the *Jean Bart* was slightly hurt, concealing the loss of the *Courbet*."

The Austrian official report of December 24 said submarine *No. 12* had attacked a French squadron of 16 ships in the Otranto Channel, and that two battleships of the *Courbet* type had been torpedoed. The result was not known owing to the prevalence of high seas.

M. Augagneur, French Minister of Marine, issued the following official statement on the same day:

"An Austrian submarine torpedoed a French armored cruiser in the Strait of Otranto. Two torpedoes were fired, one of them exploding forward. The damage done to the vessel was unimportant. None of the cruiser's crew was injured."

The *Courbet* and *Jean Bart* are sister ships of 23,096 tons displacement and a speed of 20 knots. Their main battery consists of twelve 12-inch guns in pairs in turrets, two forward and two aft, and twenty-two 5.5-inch guns. They have a complete armor belt of 16.1 feet wide. They were built respectively at Lorient and Brest in 1911-12.—*N. Y. Sun*, 1/12.

FRENCH SUBMARINE "CURIE" SUNK.—An official telegram from Vienna December 24 says: "The French submarine *Curie* was fired upon by our coast batteries without having been able to deliver any attack. The men of her crew were imprisoned."—*Naval and Military Record.*

DARDANELLES

"B 11's" PLUCKY EXPLOIT.—An official statement issued by the Admiralty on Monday told how on Sunday submarine *B 11*, Lieutenant Norman D. Holbrook, entered the Dardanelles, and "in spite of the difficult current dived under five rows of mines and torpedoed the Turkish battleship *Messudiyeh*, which was guarding the minefield. Although pursued by gunfire and torpedo-boats, *B 11* returned safely, after being submerged on one occasion for nine hours. When last seen the *Messudiyeh* was sinking by the stern." Having been built in 1874 at Blackwall, the *Messudiyeh* was a very old ship, although she was reconstructed and re-engined at Genoa, in 1902. Of 9120 tons, she was designed for 16 knots, and carried two 9.2-inch, twelve 6-inch, fourteen 3-inch, and smaller guns, with iron armor of a maximum thickness of 12 inches. She was one of three battleships in the Turkish Navy, the others being the two vessels launched in 1891 and purchased from Germany in 1910.—*Army and Navy Gazette*, 12/19.

TURKISH CAPTAIN DESTROYS HIS OWN SHIP.

SOFIA.

A telegram from Constantinople states that an Anglo-French squadron November 1 entered the Gulf of Chesmeh for the purpose of attacking the small Turkish gunboat *Berak* and the coasting steamer *Kynahada*. The commander of the gunboat, however, in order to avoid being destroyed by the enemy, sank the *Kynahada* and blew up the gunboat.—*Reuter, Naval and Military Record*, 11/4.

"GOEBEN" IN ACTION.—On November 11 the *Goeben* chased a Russian transport, which was sunk by its crew rather than surrender. On November 18 she was severely injured in an encounter with the Russian fleet and withdrew to the Golden Horn for repairs. The fact that she made a

slow, feeble resistance in this last encounter has led naval experts to surmise that the innovations for which she is noted are not practical.

When the *Goeben* was launched in 1912 great things were expected of her. She combined the swiftness of a destroyer with the armament of a dreadnought. She could make 28 knots an hour and carried ten 11-inch and twelve 6-inch guns, twelve 24-pounders, and four 20-inch torpedo tubes, two of which were submerged. Her displacement was 23,000 and her complement 1107. She and her sister ship, the *Moltke*, boasted of many improvements, notably the turning of turrets by electric gear in seven or eight seconds, a torpedo net with a 400-foot spread, and electric steering apparatus.—*N. Y. Times.*

BLACK SEA ENGAGEMENT.—The Russian Black Sea fleet has fought a successful action with a German-Turkish squadron, as a result of which the *Goeben* is reported to have been damaged, so much so that only her speed is said to have saved her from destruction. The official statement of the Headquarters Staff at Petrograd is as follows:

About noon on November 18, when our battleship division was returning from a cruise along the Anatolian coast and was abreast of Sebastopol, it sighted, twenty-five miles off the Chersonese Lighthouse, the *Goeben* and the *Breslau*. Our ships immediately took battle formation, and holding a course which placed the enemy to the starboard, opened fire at a range of forty cable lengths. The first salvo of the 12-inch guns of the flagship *Evstafii* hit the *Goeben*, bursting on the center of her freeboard and causing a fire on board. Our other ships then opened fire. We made excellent practice, and a whole series of explosions were noticeable on the *Goeben's* hull. The *Goeben* opened fire after some delay. The enemy had evidently not expected to meet us. Finally, she opened with salvos from her big guns, which she concentrated on our flagship. The battle lasted fourteen minutes, and then the *Goeben* swiftly changed course, and, thanks to her superior speed, disappeared in the fog. The *Breslau*, which had taken no part in the action, remained in the offing. Only slight damage was suffered by the *Evstafii*. Our casualties were four officers and twenty-nine men killed, and one officer and twenty-four men wounded.

Further details show that the Russian squadron, under the command of Admiral Eberhardt, discovered the *Goeben* and *Breslau* proceeding towards Yalta. The former was discerned in the fog at a distance of four miles, but owing apparently to some confusion she gave the Russians time to alter their formation and open fire. Not until the first salvo from their 12-inch guns had struck the *Goeben's* upper deck did she reply, but with such poor marksmanship that only one shell got home against the *Evstafii*, according to a report from Petrograd.

THE "HAMIDIEH" AT TUAPSE.—The Turkish cruiser *Hamidieh*, escorted by several torpedo-boats, appeared off Tuapse and bombarded the place. The cruiser fired about 125 shells, according to the official Russian account, which says that the Russian artillery replied immediately, making very effective practice. The Russian losses were three soldiers killed and several wounded. One civilian was also killed and ten others wounded. The damage done by the Turkish fire was insignificant.—*Army and Navy Gazette*, 10/28.

BLACK SEA FIGHTS.

AMSTERDAM, October 31.

The *Frankfurter Zeitung* learns from Constantinople that the Turkish battle cruiser *Sultan Jawus Selim* (formerly the *Goeben*) has successfully bombarded Sebastopol.

The same journal publishes the following official telegram from Constantinople:

"A small part of the Turkish fleet in the Black Sea on Thursday sank the Russian minelayer *Prut* (5000 tons), which had on board 700 mines, damaged a Russian torpedo-boat, and seized a collier.

"A torpedo fired from a Turkish torpedo-boat sank the Russian destroyer (?) *Kubanetz*. The *Mauvenet-i-Millet* torpedoed another Russian coast-guard ship, which was severely damaged. Three Russian officers and 72 sailors were saved by us and imprisoned. The Turkish fleet suffered no loss, and the battle is being successfully continued."

According to a telegram received in Berlin from Constantinople, the Turkish fleet has sunk not two but four torpedo-boats and one gunboat.

Another account is given by the Constantinople correspondent of the *Berliner Tageblatt* of the operations of the Turkish fleet. It is stated that the fleet set fire to fifty oil reservoirs at Novorossisk and sank fourteen transports. It also destroyed several grain warehouses and the wireless station there.

At Odessa, the correspondent declares, the Turks damaged five transports and set fire to five oil reservoirs. The fire of the Russian artillery, both at Odessa and at Sebastopol, was ineffective.—*Reuter, Naval and Military Record*, 11/4.

FAR EAST

Naval powers in the Far East are represented as follows:

FRANCE

2 armored cruisers.
1 destroyer.
1 gunboat.
4 river gunboats.

GREAT BRITAIN

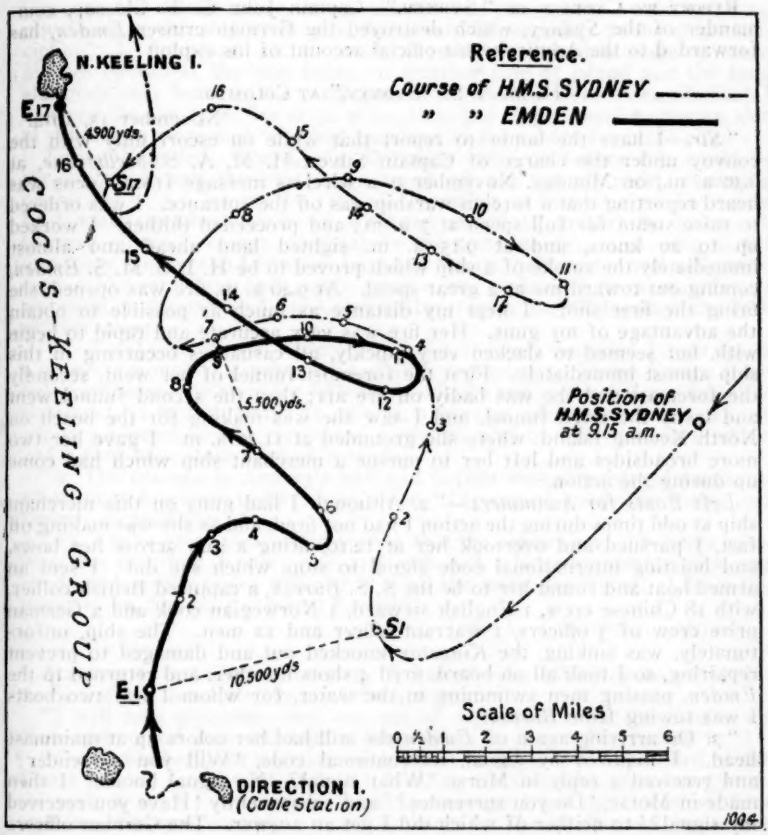
1 battleship.
2 light cruisers.
2 cruisers.
8 destroyers.
4 torpedo-boats.
3 submarines.
10 river craft.
6 sloops.
Some other small craft.
(The armored cruisers have a speed of from 20 to 25 knots, and the destroyers, 26 knots.)

JAPAN

2 dreadnoughts.
13 pre-dreadnoughts.
2 battle cruisers.
13 armored cruisers.
13 light cruisers.
52 destroyers.
27 torpedo-boats.
15 submarines.

DESTRUCTION OF "EMDEN"

REPORT OF "EMDEN'S" CAPTAIN.—Captain von Muller, late of the German cruiser *Emden*, destroyed by the Austrian cruiser *Sydney*, has been permitted by the British navy authorities to forward the following report to Berlin on the destruction of his ship: "The English cruiser *Sydney* approached the Cocos Island at full speed when a landing party of the *Emden* was about to destroy the cable. The engagement of the two cruisers started immediately. Our gunnery was good at first, but soon the fire of the heavy English guns commenced to tell and caused heavy losses to our men. The ammunition ran short and we had to cease firing. Although the steering apparatus was damaged by the enemy's fire, we tried to get within torpedo range of the *Sydney*. This maneuver, however, failed, since the smokestacks were destroyed, and thus the speed of the *Emden* was greatly reduced. The ship therefore had to be beached. Meanwhile the landing party had succeeded in getting away aboard a schooner lying near the island. The English cruiser pursued them, but returned in the afternoon and shelled the wreck of the *Emden*. To avoid further bloodshed I surrendered with the rest of the crew. The losses of the *Emden* are as follows: six officers, four deck officers, twenty-six non-commissioned officers and ninety-three men dead; one non-commissioned officer and seven men severely wounded."—*Army and Navy Journal*, 1/2.



The numbers in the above diagram indicate the respective positions of H. M. S. *Sydney* and of the *Emden* at various stages of the decisive action on November 9.

Key: H. M. S. *Sydney*
- 1- 7 Port Battery.
- 8-11 Starboard Battery.
- 12-16 Port Battery.
- 17 Starboard Battery.

Thereupon the *Sydney* "Ceased Fire," and steered N. in pursuit of the *Emden's* collier.

	H. M. S. SYDNEY	EMDEN
Built	1913	1909
Tonnage	5,400	3,544
Armament	eight 6-in. guns	ten 4.1-in. guns
	four 3-pr. guns	four 2.1-in. guns
	4 machine guns	4 machine guns
	2 torpedo tubes	2 torpedo tubes
Speed	25.5 knots	25 knots

REPORT BY CAPTAIN OF "SYDNEY."—Captain John C. T. Glossop, commander of the *Sydney*, which destroyed the German cruiser *Emden*, has forwarded to the Admiralty his official account of his exploit:

H. M. A. S. "SYDNEY," AT COLOMBO

November 15, 1914.

"*Sir.*—I have the honor to report that while on escort duty with the convoy under the charge of Captain Silver, H. M. A. S. *Melbourne*, at 6.30 a. m., on Monday, November 9, a wireless message from Cocos was heard reporting that a foreign warship was off the entrance. I was ordered to raise steam for full speed at 7 a. m., and proceeded thither. I worked up to 20 knots, and at 9.15 a. m. sighted land ahead and almost immediately the smoke of a ship which proved to be H. I. G. M. S. *Emden*, coming out toward me at a great speed. At 9.40 a. m. fire was opened, she firing the first shot. I kept my distance as much as possible to obtain the advantage of my guns. Her fire was very accurate and rapid to begin with, but seemed to slacken very quickly, all casualties occurring in this ship almost immediately. First the foremost funnel of her went, secondly the foremast and she was badly on fire aft; then the second funnel went and lastly the third funnel, and I saw she was making for the beach on North Keeling Island, where she grounded at 11.20 a. m. I gave her two more broadsides and left her to pursue a merchant ship which had come up during the action.

Left Boats for Swimmers.—"2. Although I had guns on this merchant ship at odd times during the action I had not fired, and as she was making off fast, I pursued and overtook her at 12.10, firing a gun across her bows, and hoisting international code signal to stop, which she did. I sent an armed boat and found her to be the S. S. *Buresk*, a captured British collier, with 18 Chinese crew, 1 English steward, 1 Norwegian cook and a German prize crew of 3 officers, 1 warrant officer and 12 men. The ship, unfortunately, was sinking, the *Kingston* knocked out and damaged to prevent repairing, so I took all on board, fired 4 shots into her, and returned to the *Emden*, passing men swimming in the water, for whom I left two boats I was towing from *Buresk*.

"3. On arriving again off *Emden* she still had her colors up at mainmast head. I inquired by signal, international code, 'Will you surrender?' and received a reply in Morse 'What signal? No signal books.' I then made in Morse, 'Do you surrender?' and subsequently 'Have you received my signal?' to neither of which did I get an answer. The German officers on board gave me to understand that the captain would never surrender, and therefore, though very reluctantly, I again fired at her at 4.30 p. m., ceasing at 4.35, as she showed white flags and hauled down her ensign by sending a man aloft.

"4. I then left the *Emden* and returned and picked up the *Buresk's* two boats, rescuing two sailors (5.0 p. m.), who had been in the water all day. I returned and sent in one boat to *Emden*, manned by her own prize crew from *Buresk* and one officer, and stating I would return to their assistance next morning.

"5. I lay on and off all night and communicated with Direction Island at 8.0 a. m., November 10, to find that the *Emden's* party, consisting of 3 officers and 40 men, 1 lanuch and 2 cutters, had seized and provisioned a 70-ton schooner (the *Ayesha*), having 4 Maxims with 2 belts to each. They left the previous night at six o'clock. The wireless station was entirely destroyed, 1 cable cut, 1 damaged, and one intact. I borrowed a doctor and two assistants and proceeded as fast as possible to *Emden's* assistance.

"6. I sent an officer on board to see the captain, and in view of the large number of prisoners and wounded and lack of accommodation, etc., in this ship, and the absolute impossibility of leaving them where they were, he agreed that if I would receive his officers and men and all wounded,

'then as for such time as they remained in *Sydney* they would cause no interference with ship or fittings, and would be amenable to the ship's discipline.' I, therefore, set to work at once to tranship them—a most difficult operation, the ship being on weather side of island and the send alongside very heavy. The conditions in the *Emden* were indescribable. I received the last from her at 5.0 p. m., then had to go round to the lee side to pick up 20 more men who had managed to get ashore from the ship.

Takes Wounded Aboard.—"7. Darkness came on before this could be accomplished, and the ship again stood off and on all night, resuming operations at 5 a. m. on the 11th of November, a cutter's crew having to land with stretchers to bring wounded round to embarking point. A German officer, a doctor, died ashore the previous day. The ship in the meantime ran over to Direction Island to return their doctor and assistants, send cables, and was back again at 10 a. m., embarked the remainder of wounded, and proceeded for Colombo by 10.35 a. m. Wednesday, the 11th of November.

"8. Total casualties in *Sydney:* Killed 3, severely wounded (since dead) 1, severely wounded 4, wounded 4, slightly wounded 4. In the *Emden* I can only approximately state the killed at 7 officers and 108 men from captain's statement. I had on board 11 officers, 9 warrant officers, and 191 men, of whom 3 officers and 53 men were wounded, and of this number 1 officer and 3 men have since died of wounds.

"9. The damage to *Sydney's* hull and fittings was surprisingly small; in all about 10 hits seem to have been made. The engine and boiler rooms and funnels escaped entirely.

"13. I have great pleasure in stating that the behavior of the ship's company was excellent in every way, and with such a large proportion of young hands and people under training it is all the more gratifying. I have the honor to be, Sir, your obedient Servant,

JOHN C. T. GLOSSOP, *Captain.*"

ACCOUNT BY AN OFFICER OF THE "SYDNEY."—An officer on board H. M. A. S. *Sydney,* in a letter to his father, writes:

"I will now give you some account of our action with the *Emden* on November 9 and some subsequent happenings on November 10 and 11.

"On November 9 we were steaming about 50 miles to the eastward of the Cocos Islands (southwest of Java), heading for Colombo, when at 7 a. m. we took in a very interrupted wireless message from the Cocos wireless station—'Strange warship . . . off entrance.' The *Melbourne,* as senior officer, ordered us to raise steam for full speed and go and investigate.

"At 9.15 a. m. the tops of the cocoanut trees of Keeling Islands were sighted. At 9.20 we sighted the *Emden,* or rather the tops of her funnels, 12 or 15 miles away. At 9.40 a. m. she opened fire at a very big range, and shortly after that we started in on her.

"Throughout the action I was almost constantly engaged running backwards and forwards between the ammunition hoist and the forecastle gun, or between the hoist and No. 1 starboard or No. 1 port.

"Once I heard a crash and looking aft saw that a shell had hit near gun No. 2 starboard. But owing to the screen being in the way, I did not know it had knocked out practically the whole of that gun's crew. Not seeing any flame or smoke rising (we cope with the smallest fire immediately) I went on with my job. This required continual attention. The men are splendid at loading drill, but to practice supply of ammunition is almost impossible in peace time. To have a big supply stacked on the upper deck is far too dangerous a proceeding in action, and what with getting an even distribution of projectiles and cartridges between the two guns, getting the safety caps off, with fiddly pins and things to take out, attending to missfires, cheering up the one or two who seemed to be 'pulling dry,' you can imagine I had little time to be thinking much about the *Emden.* I noticed once or twice when going forward the starboard side to the fore-

castle gun that we seemed to be in the thick of it. There was a lot of 'Wheee-oo, Wheee-oo, Wheee-oo,' and the 'But-but-but' of the shell striking the water beyond, and as the range was pretty big, this is quite possible, since the angle of descent would be pretty steep.

"Coming aft, I heard a shot graze the top of the shield of No. 1 starboard. A petty officer now came up limping from aft, and said that he had just carried an officer below (he was not dangerously hit), and that the after control position had been knocked right out, and every one wounded (they were marvellously lucky). I told him if he was really able to carry on to go aft at No. 2 starboard and see there was no fire, and if there was, that any charges about were to be thrown overboard at once. He was very game and limped away aft. He got aft to find a very bad cordite fire just starting. He with others got this put out. I later noticed some smoke rising aft, and ran aft to find that it was just the remains of what they had put out, but found two men, one with a badly wounded foot, sitting on the gun platform, and a petty officer lying on the deck a little further aft, with a nasty wound in his back. I found one of the men was unwounded, but badly shaken. However, he pulled himself together when I spoke to him, and told him I wanted him to do what he could for the wounded. I then ran back to my group.

"All the time we were going 25 and sometimes as much as 26 knots. We had the speed on the *Emden* and fought as suited ourselves. We next changed round to starboard guns and I then found the gunlayer of No. 1 starboard had been knocked out close to the conning-tower, so I brought Atkins over to fire No. 1 starboard. I was quite deaf by now, as in the hurry there had been no thought of getting cotton wool. This is a point I won't overlook next time.

"Coming aft the port side from the forecastle gun I was met by a lot of men cheering and waving their caps. I said, 'What's happened?' 'She's gone, Sir, she's gone.' I ran to the ship's side, and no sign of a ship could I see. If one could have seen a dark cloud of smoke, it would have been different. But I could see no sign of anything. So I called out, 'All hands turn out the lifeboats, there will be men in the water.' They were just starting to do this when someone called out, 'She's still firing, Sir,' and every one ran back to the guns. What had happened was a cloud of yellow or very light colored smoke had obscured her from view, so that looking in her direction one's impression was that she had totally disappeared. Later we turned again and engaged her on the other broadside.

"By now her three funnels and her foremast had been shot away, and she was on fire aft. We turned again, and after giving her a salvo or two with the starboard guns saw her run ashore on North Keeling Island. So at 11.20 a. m. we ceased firing, the action having lasted 1 hour and 40 minutes.

"Our hits were not very serious. We were 'hulled' in about three places. The shell that exploded in the boys' mess deck, apart from ruining the poor little beggars' clothes, provided a magnificent stock of trophies. For two or three days they kept finding fresh pieces. The only important damage was the after control platform, which is one mass of gaping holes and tangled iron, and the foremost range-finder shot away. Other hits, though 'interesting,' 'don't signify.'

"We started chasing a collier which had been in attendance on the *Emden*, and when we boarded her we found they had opened the sea cocks and the ship was sinking fast, so we took every one off her and returned to the *Emden*, getting back there at about 4 p. m.

"They sent a man aloft to cut down the colors, and waved a big white flag from forward. It was getting dark and we did not know for certain that the cruiser *Königsberg* might not be near, so we could do no rescue work that night and had to steam away. A cry in the darkness, and we stopped, and lifeboats were lowered to pick up a nearly exhausted but very lucky German sailor. The fourth rescued from the water that day.

"November 10.—Early in the morning we made for the cable station, to find that the party landed by the Germans to destroy the station had seized

a schooner and departed. The poor devils aren't likely to go far with a leaking ship and the leathers removed from all the pumps. Although they had broken up all the instruments, the cable people had a duplicate set buried, so that was satisfactory.

"At 11.10 a. m. we arrived off the *Emden* again. I was sent over to her in one of the cutters. Luckily her stern was sticking out beyond where the surf broke, so that with a rope from the stern of the ship one could ride close under one quarter, with the boat's bow to seaward. The rollers were very big, and the surging to and fro and so on made getting aboard fairly difficult. However, the Germans standing aft gave me a hand up, and I was received by the captain of the *Emden*. I told him from our captain that if he would give his parole the captain was prepared to take all his crew on board the *Sydney* and take them straight up to Colombo. He stuck a little over the word 'parole,' but readily agreed when I explained the exact scope of it. And now came the dreadful job of getting the badly wounded into the boats. There were 15 of these. Luckily we have a very good pattern of light stretcher into which men can be strapped. We got three badly wounded in each boat. The Germans were all suffering badly from thirst, so we hauled the boats' water casks up on deck, and they eagerly broached them, giving the wounded some first.

"I took an early opportunity of saluting the captain of the *Emden* and saying, 'You fought very well, sir." He seemed taken aback, and said 'No.' I went away, but presently he came up to me and said, 'Thank you very much for saying that, but I was not satisfied. We should have done better. You were very lucky in shooting away all my voice-pipes at the beginning.'

"When I got a chance, with all the boats away, I went to have a look round the ship. I have no intention of describing what I saw. With the exception of the forecastle, which is hardly touched from forebridge to stern post, she is nothing but a shambles, and the whole thing was most shocking. The German doctor asked me to signal for some morphia, sent me aft, and I never came forward again."—*London Times*, 12/15.

THE "EMDEN" AT PENANG.—A detailed account of the *Emden's* raid on Penang on October 28 is given in a letter, quoted in the *Daily Chronicle*, from Mr. Harry Picken, of West Hartlepool, an engineer in the steamer *Nigaristan*. He says the crew were awakened by the noise of gun firing, and saw the *Emden* not 200 yards away from the *Nigaristan* emptying her broadsides into the Russian cruiser *Jemtchug*, which was lying at anchor. The *Emden*, which had stolen up in the dark after having evaded two scouts, came right into the harbor, and, steaming once round the Russian warship, fired a broadside into her.

"She then turned round, nearly hitting her stern in doing so," continues Mr. Picken, "and let the Russian have her other broadside, blowing up her magazine. There was a tremendous crash, and the Russian was no more. It was all over in 13 minutes. All this happened within an eighth of a mile from us. The *Emden* was practically between us and the Russian, and what few shots the Russian got in either hit the *Emden* or went high, whizzing over our heads. One shot which flew over our stern burst over the steamer *Cranfield* and nearly killed the second engineer. He is now in hospital with his ribs smashed in." At the time there were three French torpedo boats in the harbor, but the *Emden*, he thinks, cannot have seen them or she would have had them too. She met one as she went out, and sank her with four shots, saving all the crew. Mr. Picken declares emphatically that the Russian vessel was not torpedoed. "We were nearest of anyone," he says, "and saw every shot fired and the effect of every shot." He mentions that on the way out the *Emden* met a patrol boat, and thinking it was a destroyer, fired but missed. Discovering his mistake, the captain lowered a boat and sent an officer on board an English ship to ask the skipper to apologize to the authorities for his having fired at a non-combatant, and to give his best respects to the Admiralty people ashore.—*Army and Navy Gazette*, 12/15.

The *Jemchug*, a third-class cruiser of 3130 tons displacement, was built at the Nevsky Yard, Petrograd, where she was launched in 1903 and completed just 10 years ago. Her length was 347¾ feet, breadth 41½ feet, and draft 16 feet. She had a horse-power of 17,000, and was fitted with Yarrow water-tube boilers, her contract speed being 23 knots. The vessel's armament consisted of eight 4.7-inch and six 1.8-inch guns, and six smaller quick-firing and machine guns. She had a complement of about 340.—*Naval and Military Record*, 11/4.

OPERATIONS IN ARABIA

LONDON, November 3.

The Secretary of the Admiralty issues the following statement:

On arrival at Akaba, H. M. S. *Minerva* found the place in the occupation of soldiers, one of whom had the appearance of a German officer, and armed natives.

The *Minerva* then shelled the forts and the troops. The town was evacuated, and a landing party proceeded to destroy the forts, the barracks, the post-office, and the stores.

There was some loss to the enemy, but no British casualties.

Note.—Akaba, a town of one of the Turkish provinces in Arabia, stands at the head of the Gulf of Akaba, which forms the eastern horn of the Red Sea, and divides Arabia and the Sinai Peninsula. Akaba is on the eastern border of the peninsula (which is Egyptian territory), and the importance of its position is thus evident. It is here that Turkish forces were recently reported to have arrived.—*Naval and Military Record*, 11/4.

FAO OCCUPIED BY BRITISH.—The Secretary of the British Admiralty announced that a successful operation against Fao, at the mouth of the Shat-El-Arab, Persian Gulf, had been conducted by a military force from India covered by H. M. S. *Odin* (Commander Cathcart R. Wason), the armed launch *Sirdar*, a force of marines with a maxim-gun party, and a boat from the *Ocean*. The enemy's guns were silenced after an hour's resistance, and the town was occupied by the troops and the Naval Brigade. There were no naval casualties. It was expected that no further opposition would be met with below Fao.

OPERATIONS AGAINST GERMAN EAST AFRICA.—A despatch from Nairobi, British East Africa, of January 4, states that the British battleship *Goliath* and the light cruiser *Fox* have carried out successful operations against Dar-es-Salaam, capital of German East Africa, and a military station. The warships bombarded the town, inflicting considerable damage. All the German vessels in the harbor were disabled. Fourteen Europeans and 20 natives were taken prisoners. The British loss was one killed and 12 wounded. Dar-es-Salaam, the best built town on the coast of German East Africa, is a military station, with an excellent harbor, situated 40 miles south of Zanzibar. It is the terminus of an important caravan route, the residence of a governor and has large commercial interests. The white population in 1909 was estimated at 1000, the total population at more than 20,000.—*Army and Navy Journal*, 1/9.

BASRA OCCUPIED.—The important Turkish port of Basra, fifty-five miles up the broad river known as the Shatt-el-Arab, has been taken by a combined naval and military expedition in a very short time. It was occupied on November 21, and war with Turkey was not declared until November 5. Remembering that the military force had to travel from India—nearly 1500 miles—this achievement in sixteen days was a splendid one for the British forces concerned. Only good organization and effective co-operation between the sea and land officers could have achieved such a result. Also the affair is one more tribute to the many advantages which are possessed by the power whose fleet is superior enough to exercise com-

mand of the sea, for had not the navy been able to carry General Barrett's troops on its back, so to speak, this heavy blow at Turkey and Germany could not have been struck. The importance of Basra is considerable from a commercial and political point of view, and the moral effect produced in Turkey by its fall must be considerable. The place was a center of German activity, and the Hamburg-Amerika Company had a line of steamers running there. Consequently the incapacity of the Germans to prevent its falling such an apparently easy prey to the British seamen and soldiers ought to open the eyes of the Turks to the fate which awaits other of their possessions.—*Army and Navy Gazette*, 11/28.

OPERATIONS OF AUSTRALIAN FLEET.—A general outline of the operations of the Australian fleet has now been made public. Immediately on the outbreak of the war the Australian fleet unit left Sydney, acting in cooperation with the China squadron. A search for the enemy's cruisers has been prosecuted (so far without success), and the enemy's wireless stations in the Pacific put out of action. The operations also included the covering of the New Zealand expedition for the seizure and occupation of Samoa, which the steps taken by the Australian fleet assisted to render safe.

It is already known that the operations of the fleet include the capture and occupation of Simpsonshafen, the headquarters of the enemy's government of the German possessions in New Guinea; New Britain, and the Bismarck Archipelago—operations that will still call for some further work before being complete. In addition to this, all measures have been taken for the safeguarding of our trade routes and commerce.

During the period from August 1 to September 12 the *Melbourne* has covered nearly 12,000 miles, and has only spent parts of 10 days in harbor, and nine were occupied in coaling. The greater part of this work has been done in the tropics. The *Melbourne* has covered the longest distance, but all H. M. A. vessels have accounted for a very considerable mileage.

The following particulars of the hoisting of the flag at Samoa are published by the Minister for Defence from the official report: The expedition arrived off Apia at 7.45 a. m. on August 30, and a flag of truce demanding the governor to surrender the town of Apia and dependencies was sent in. The governor was absent, and the acting-governor replied, "I leave it to your Excellency to take possession of the Protectorate of Samoa, and respectfully remark that the responsibility for the life and property of the European population must rest with you."

There was a probability that the channel had been mined, but on sweeping none were found. The transports *Moeraki* and *Monowai* entered the harbor at 11.30 a. m., and the landing of the expedition began. The Union Jack was hoisted on shore at 1 p. m., and the flag over the governor's residence hauled down at 1.30 p. m. The troops were landed at 2.30 p. m. without mishap.—*Naval and Military Record*, 11/4.

OFF KIAO-CHAU

TOKIO, November 11.

It is officially announced that the Japanese torpedo-boat *No. 33* was sunk while dragging for mines at the mouth of Kiao-chau Bay.

The majority of the crew have been saved.

[*Note.*—Torpedo-boat *33* was 14 years old, of the Schichau type, and had a displacement of 82 tons, and a speed of 24 knots. She carried three torpedo-tubes and one 3-pounder gun.]—*Press Association War Special.*

SEVEN WARSHIPS BLOWN UP BEFORE THE SURRENDER

LONDON, November 15.

The Secretary of the Admiralty announces that information has been received that the following enemy vessels were found sunk through explosion in Tsing-tao on the surrender of the fortress: Austrian light cruiser

Kaiserin Elizabeth; German gunboats *Iltis, Jaguar, Luchs, Tiger,* and *Cormoran;* German destroyer *Taku;* minelayer *Ruahin.*

The *Kaiserin Elizabeth* was an old second-class cruiser, built at Pola, where she was launched in 1890 and completed in 1892. She had a displacement of 4000 tons, and her length was 321½ feet; beam, 47½ feet; draft, 18½ feet. With an indicated horse-power of 8000, she could steam 19 knots an hour. Her armament consisted of two 9.4-inch, six 5.9-inch, thirteen 1.8-inch, four machine guns, two light guns, and five torpedo-tubes. She had a complement of 418 officers and men.

The gunboats *Iltis, Jaguar, Luchs,* and *Tiger* each had a complement of 126 officers and men. They were completed between 1898 and 1900, the displacement and cost of the quartette being: *Iltis,* 881 tons, £100,000; *Jaguar,* 900 tons, £90,000; *Luchs,* 962 tons, £91,000; and *Tiger,* 962 tons, cost not stated. The armament of the four consisted of eight 3.4-inch, six 1.4-inch, and two machine guns. With an indicated horse-power of 1300, they could attain a speed of 13½ knots.

The gunboat *Cormoran,* built in 1892, had a displacement of 1630 tons, and could steam 17 knots an hour. She mounted eight 4.1-inch guns and five 1-pounders, and had two 14-inch torpedo-tubes.

The destroyer *Taku* was not built for the German Government, but was captured from the Chinese during the Boxer campaign. She was completed in 1899, had a displacement of 280 tons, and, with a nominal horse-power of 6000, could do 30 knots an hour. Her complement was 49 officers and men.—*Naval and Military Record,* 11/18.

"KOENIGSBERG" REPORTED SUNK.

LONDON, January 11.

The German cruiser *Koenigsberg,* which was bottled up in a river on the coast of Africa several weeks ago, has been sunk, according to a despatch received here to-day from Southend. The despatch says that Captain Willet, commander of one of the blockading vessels, made the announcement.

According to the despatch an aeroplane was sent to get the range of the trapped vessel. This was obtained and the blockading fleet began a bombardment. The fifth day after the *Koenigsberg* was chased up the river a shell which struck her did vital damage.

The *Koenigsberg* was a third-class cruiser of 3350 tons, carrying ten 4.1-inch guns and eight 2.1-inch guns. Her speed was 23.5 knots.—*N. Y. Sun,* 1/12.

PACIFIC AND ATLANTIC

GERMANY

American Waters

Nurnberg, Dresden, Karlsruhe } light cruisers.

ENGLAND

East Indies.
1 battleship.
2 light cruisers.

Persian Gulf.
4 small craft.

Cape of Good Hope.
3 cruisers.
1 gunboat.

New Zealand.
3 cruisers.
1 sloop.

Royal Australian Navy.
1 battle cruiser.
3 light cruisers.
3 destroyers.
2 submarines.

West coast Canada.
2 submarines.

West coast of America.
2 gunboats.

It is reported that about 20 British and French ships are in South American waters and it is probable that they are co-operating with a Japanese cruiser squadron. (The battle cruisers engaged off Falkland Islands may have returned to England.)

ENGAGEMENT OFF CORONEL.—News has now been received from H. M. S. *Glasgow,* which was with the *Good Hope* and the *Monmouth* when the latter vessels were sunk by the German cruisers off Chile, and it appears that the *Canopus* was miles away when the action was fought. There seems to be something here requiring official inquiry and examination, because it was stated by the Admiralty when the first accounts of the battle were received that the *Canopus* should have been near at hand. At any rate, the *Glasgow* got in a few shots before she obeyed admiral's orders to show her heels.

The Secretary of the Admiralty issued the following statement early on the morning of the 18th inst.:

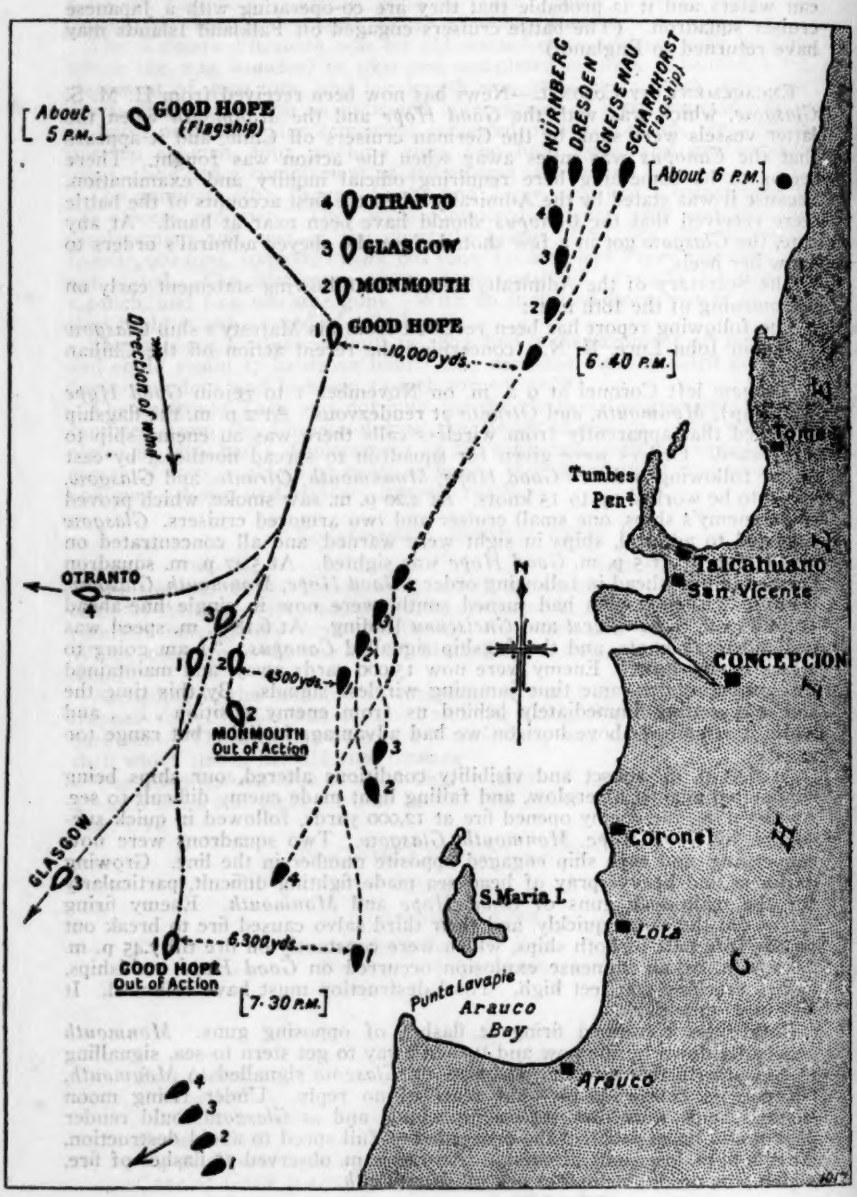
The following report has been received from his Majesty's ship *Glasgow* (Captain John Luce, R. N.), concerning the recent action off the Chilian coast:

Glasgow left Coronel at 9 a. m. on November 1 to rejoin *Good Hope* (flagship), *Monmouth,* and *Otranto* at rendezvous. At 2 p. m. the flagship signalled that apparently from wireless calls there was an enemy ship to northward. Orders were given for squadron to spread northeast by east in the following order: *Good Hope, Mounmouth, Otranto,* and *Glasgow,* speed to be worked up to 15 knots. At 4.20 p. m. saw smoke, which proved to be enemy's ships, one small cruiser and two armored cruisers. *Glasgow* reported to admiral, ships in sight were warned, and all concentrated on *Good Hope.* At 5 p. m. *Good Hope* was sighted. At 5.47 p. m. squadron formed in line-ahead in following order: *Good Hope, Monmouth, Glasgow, Otranto.* Enemy, who had turned south, were now in single line-ahead 12 miles off, *Scharnhorst* and *Gneisenau* leading. At 6.18 p. m. speed was ordered to 17 knots, and the flagship signalled *Canopus:* "I am going to attack enemy now." Enemy were now 15,000 yards away, and maintained this range, at the same time jamming wireless signals. By this time the sun was setting immediately behind us from enemy position . . . . and while it remained above horizon we had advantage in light, but range too great.

At 6.55 p. m. sunset and visibility conditions altered, our ships being silhouetted against afterglow, and failing light made enemy difficult to see. At 7.03 p. m. the enemy opened fire at 12,000 yards, followed in quick succession by *Good Hope, Monmouth, Glasgow.* Two squadrons were now converging, and each ship engaged opposite number in the line. Growing darkness and heavy spray of head sea made fighting difficult, particularly for the main-deck guns of *Good Hope* and *Monmouth.* Enemy firing salvos got the range quickly, and their third salvo caused fire to break out on the fore part of both ships, which were constantly on fire till 7.45 p. m. At 7.50 p. m. an immense explosion occurred on *Good Hope* amidships, flames reaching 200 feet high. Total destruction must have followed. It was now quite dark.

Both sides continued firing at flashes of opposing guns. *Monmouth* was badly down by the bow and turned away to get stern to sea, signalling to *Glasgow* to that effect. At 8.30 p. m. *Glasgow* signalled to *Monmouth,* "Enemy is following us," but received no reply. Under rising moon enemy's ships were now seen approaching, and as *Glasgow* could render *Monmouth* no assistance, she proceeded at full speed to avoid destruction. At 8.50 p. m. lost sight of enemy. At 9.26 p. m. observed 75 flashes of fire, which was no doubt final attack on *Monmouth.*

NEWS FROM BRAZIL.—News from Rio de Janeiro on November 20 stated that the *Glasgow* was there repairing, having five holes in her hull made by shells. She reports that at the very beginning of the engagement, in view of


[About 5 P.M.]
GOOD HOPE (Flagship)
4 OTRANTO
3 GLASGOW
2 MONMOUTH
1 GOOD HOPE
10,000 yds.
Direction of wind
NÜRNBERG
DRESDEN
GNEISENAU
SCHARNHORST (Flagship)
[About 6 P.M.]
[6.40 P.M.]
Tumbes Pen.
Talcahuano
San Vicente
CONCEPCION
OTRANTO
4300 yds.
MONMOUTH Out of Action
GLASGOW
6,300 yds.
GOOD HOPE Out of Action
[7.30 P.M.]
S. Maria I.
Lota
Coronel
Punta Lavapie
Arauco Bay
Arauco
N

the far superior range and gun power of the German vessels, Admiral Cradock ordered the *Glasgow* and the auxiliary cruiser *Otranto* to seek a place of refuge. Notwithstanding this order, the *Glasgow* answered the fire of the Germans and herself sustained damage and casualties, four of her bluejackets being wounded. Within a few minutes of the opening of the engagement the *Good Hope* had one of her 9.2-inch guns put out of action. Then her magazine exploded. The battleship *Canopus,* owing to her inferior speed of only 16 knots, was unable to reach the scene of action in time to participate in the fight.—*United Service Gazette,* 11/21.

We give opposite a diagram representing the naval action in the Pacific, off the coast of Chile, on November 1, when H. M. S. *Good Hope* and H. M. S. *Monmouth* were sunk by Admiral von Spee's squadron. The diagram is drawn from particulars supplied in the eyewitness's account of the battle published in *The Times* on December 11, and from material published in the *Union* of Valparaiso, on November 5. The following are the approximate positions:

British Squadron (White)	German Squadron (Black)
(1) H. M. S. *Good Hope* (Flagship).	(1) *Scharnhorst* (Flagship).
(2) H. M. S. *Monmouth.*	(2) *Gneisenau.*
(3) H. M. S. *Glasgow.*	(3) *Dresden.*
(4) H. M. S. *Otranto.*	(4) *Nürnberg.*

4 p. m. = 5.30 p. m.—H. M. S. *Glasgow* sighted enemy and called up squadron from NW.

5.30 p. m. = 6.30 p. m.—British squadron in line ahead came round on a southern course, with enemy seven miles off to the E., also steaming south. Sun low on British starboard beam, silhouetting ships against horizon.

6.40 p. m.—Closing in, the German squadron engaged at about 10,000 yards.

Otranto, being merely armed liner, soon after hauled out to SW.

7 p. m.—British squadron opened fire, both squadrons closing in to 4500 yards.

7 p. m. = 7.15 p. m.—*Monmouth* disabled, and fell out to SE. *Good Hope,* on fire, fell out to SE.

7.30 p. m.—*Glasgow* stood away to SW., on her way to the Magellan Straits, with the enemy in line abreast, at about 6000 yards.—*London Times,* 12/21.

The following is a letter received from an officer in the *Glasgow:*

" November 9, 1914.

" We were joined by the *Good Hope,* with Sir Christopher Cradock in command, and the *Monmouth* (Captain Brandt) off the Brazilian coast. We then cruised south together—*Good Hope, Glasgow, Monmouth* and the armed liner *Otranto*—down to the cold Terra del Fuego and Straits of Magellan, making down swoops upon wild and unsurveyed bays and places whither we had heard the enemy had gone to coal, etc., but failed to find them there, although we heard their secret and friendly wireless stations talking in code. The land round there is covered with ice and snow, and the many huge glaciers one sees are wonderful to behold.

" Well, after passing and repassing Cape Horn, sometimes twice in one day, we were glad to get orders to proceed north on the Pacific coast and to warmer weather. By this time we found that the two armored enemy's

cruisers, *Gneisenau* and *Scharnhorst*, were probably coming over from the Pacific Islands to join up with the cruisers *Leipzig*, *Dresden*, and *Nürnberg*, as they had escaped the Australian and China squadrons. We made a rendezvous farther north for our colliers, and went into Coronel and on to Valparaiso to pick up news and receive letters, etc., then back to rendezvous, coaled, and then got orders to go to Coronel alone to send cables, etc. We left Coronel, Chile, on the second occasion about 9 o'clock on the morning of November 1, and at about 4 p. m. sighted the enemy in force. We put on speed and approached them until we made out four cruisers in line ahead,

the two big armored cruisers leading and two 3-funnelled cruisers (about our class) following in open order. They immediately gave chase, so we 'hopped it' in the direction of our own ships and the Flag. We advised the Flag by wireless, but the enemy continually used their wireless in order to jam our signals. We first picked up the *Monmouth* and *Otranto* and ran a line ahead, *Glasgow*, senior, leading.

"In an hour or so the *Good Hope* (Cradock's ship) came up and we wheeled into line behind her, and again approached the enemy, coming round to south when about 7 miles off. The sun by this time was getting low on our starboard beam; the enemy were to the east of us, all proceeding

south, they having the advantage both in guns and the light; we being silhouetted against the horizon. Their strategical speed being equal to ours, it was impossible to improve the lights before dark. I did not think he would engage until next day. However, we were now gradually closing. About 6.40 p. m. or so, the foremost armored enemy's cruiser opened fire with her 8-inch, and shells shrieked over and short of us, some falling about 500 yards short, giving the impression of excellent shooting. Soon after the *Otranto* began to haul out of line and edge away to the southwest, she not being fitted to fight men-o'-war. We appeared to close a point or two, and at 7 p. m. opened fire. The enemy replied in rapid salvos, making good and deadly shooting, mostly directed against our flag, and the *Monmouth*, our next ahead. There was not much doubt as to the result. Shells continued to straddle us, some bursting overhead, throwing pieces of broken shell in all directions. About 10 minutes or so after this the poor *Monmouth* sheered off the line to the westward a hundred yards or so, when I saw her being hit heavily. She appeared to heel a bit and shake, her foremast turret (the 6-inch gun shield) in flames. She fell back again into line and out again to the eastward, still firing her 6-inch intermittently.

"Shortly after the *Good Hope* was seen to be on fire, also about the fore turret, and seemed to steer or fall away to the eastward or towards the enemy. During this time we kept up a continual fire from our two 6-inch and port battery 4-inch guns in the direction of the foremost light cruisers of the enemy's line, the third and fourth ship, of the lines, but owing to the big sea, our rolling, and the gathering darkness it was impossible to spot the fall of our shells. We could only fire at the flash of their guns, and when our heavy rolling allowed our gunlayers to see the flashes at all. About 7.30 p. m. I was standing near the after 6-inch hand up when I felt a shell strike us below deck. It seemed to pass out through the other side, but didn't, and I awaited the explosion, expecting the deck planks to rise up; but nothing visibly occurred at the moment. I was second in command of the starboard battery and, as that was the unengaged side, superintended the supply of ammunition to the port guns and generally kept an eye for casualties, so was able to use my binoculars to see what could be seen. Hills, a marine, carrying ammunition to P5, was struck behind the ear by a fragment of shell and was temporarily out of action, lying down near S5 hand up.

"The *Good Hope* fell more and more out of line to eastward, burning brightly forward, when suddenly an explosion occurred about her after funnel, blowing up *débris* and flames and sparks some 200 feet high or so, quite distinctly to be heard from our deck. Some of our men thought it was the enemy's flagship, so near had she drifted towards them. Soon after I could see nothing of her, and she never fired her guns again. Our speed during the action must have varied from 7 or 8 to 17 knots or so, and when the *Monmouth* dropped back in her distress we had to ease in order not to meet the doses meant for her. The enemy now dropped slowly back, and the armored cruisers directed their fire at us; we continued alone to reply when possible, now at about 4500 yards. Everybody was remarkably cool, as if at practice. Another shell struck our No. 2 funnel, showing large holes around the casing, and it was this or these shells which wounded three more of our men slightly.

"I cannot understand the miracle of our deliverance; none will ever. We were struck at the water-line by in all five shells out of about 600 directed at us, but strangely not in vulnerable places, our coal saving us on three occasions—as we are not armored and should not be in battle line against armored vessels. We only had two guns that would pierce their armor—the *Good Hope's* old two 9.2's, one of which was out of action 10 minutes after the start. A shell entered the captain's pantry and continued on, bursting in a passage, the fragments going through the steel wall of the captain's cabin, wrecking it completely. Again no fire resulted.

"The *Monmouth*, no longer firing, steamed off to the northwest, and we stood by her signalling. She fell off to northeast, then we asked her if she

could steer northwest. She replied, 'I want to get stern to sea as I am making water badly forward.' We followed close by. Shortly after I was on the flying bridge when I spotted the enemy approaching in line abreast, the ship to the right or southward morsing with an oil lamp to the others. They were then about 6000 yards off or so in the rain, mist, and darkness. I told the captain, who gave me orders to bring them astern, and put on full speed. We drew out of range. The *Monmouth* was silent and hidden by our smoke. About half an hour after we saw flashes of gunfire and the play of a searchlight which lasted a few seconds, then disappeared. We went in a west-northwesterly direction, coming gradually round to south, steering for Magellan Straits in order to warn our old battleship, the *Canopus*, who was coming up from the southward, to turn and run. She was near 200 miles away also and we were some hours getting through to her, because of the continual jamming by the enemy's wireless. It would have been a needless and useless sacrifice of our ship and our 370 odd lives to have remained and engaged the enemy's ships again; some 1600 lives had already gone in the *Good Hope* and *Monmouth*. Luckily our engines and boilers were intact, and we were able to push through the heavy seas at 24 knots and get away to give an account of the action, and warn the *Canopus*, who, although she no doubt would have fought gallantly, could hardly hope to successfully fight five ships."—*London Times*, 12/11.

THE BATTLE OFF THE FALKLANDS

THE SINKING OF THE GERMAN PACIFIC SQUADRON

By piecing together the many cabled accounts of the late British-German cruiser action off the Falkland Islands in the South Atlantic, we were able to gather a fairly accurate impression of that highly dramatic sea fight. The encounter marked the successful end of a search for the German ships undertaken by Vice Admiral Sturdee with the battle cruisers *Invincible* and *Inflexible* and a group of five smaller vessels.

As will be seen from the enumeration given below, the British squadron possessed a superiority in armor-piercing guns and armor as overwhelming as that which enabled Von Spee to crush the British squadron under Cradock a few weeks before.

The British fleet consisted of the battle cruisers *Invincible* and *Inflexible*, the armored cruisers *Carnarvon*, *Cornwall* and *Kent*, and the scout cruisers *Bristol* and *Glasgow*. In the German fleet were the armored cruisers *Scharnhorst* and *Gneisenau*, the protected cruiser *Leipzig* and the two fast scout cruisers *Nurnberg* and *Dresden*.

When last heard from, Von Spee's squadron, after coaling at Valparaiso, had steamed south. Apparently his objective was the British coaling station at Port Stanley in the Falkland Islands; and a rumor (to which too much credence should not be given) has it that the converted cruiser *Prinz Eitel Friederich*, with troops on board for the occupation of the station, accompanied the squadron.

Be that as it may, on the morning of December 8 the *Canopus*, an old battleship with 6-inch armor and 35-caliber guns, and the British armored cruisers and scouts, which were cruising outside the land-locked bay on which Port Stanley is located, saw the German squadron lifting above the horizon. The two British battle cruisers were inside, coaling, and according to dispatches, were not visible to Von Spee. To the German admiral it looked like an even fight, for, although it was six ships to five, there was no vessel in the British force that could match the *Scharnhorst* and *Gneisenau*. So down he drove, with ships cleared for action. Von Spee's flagship, the *Scharnhorst*, was the gold medal ship for gunnery in the German Navy, and it was her 8.2-inch salvos that had contributed mainly to the sinking of the *Good Hope* and *Monmouth*.

The fight was no sooner well under way, we are told, than out of Port Stanley steamed the two battle cruisers. They took on the *Scharnhorst* and

Gneisenau, and left the smaller vessels to fight it out among themselves. Von Spee signalled his fleet to scatter, and himself ranged up for the last bravely-fought battle of his life.

It would be very interesting to know at what range the fight between these four ships was fought. Theoretically, Admiral Sturdee, having the more powerful gun and the higher speed, should have fought just outside the range at which the 8.2-inch shells of the Germans could land with serious effect. Judging from the fact that the action lasted from 1 p. m. to 6 p. m., and that the total casualties in the whole British fleet were only nine killed and a few wounded, it is probable that Sturdee, having the speed gage, fought at an extreme range, probably 12,000 to 14,000 yards, being content to sink the German ships gradually with a minimum loss of his own personnel.

BRITISH SQUADRON

Name	Type	Date	Displacement	Belt armor	Guns	Speed
			Tons.			
Invincible.....	Battle Cruiser.....	1908	17,250	7-inch	8-12", 16-4"	26.5
Inflexible.....	Battle Cruiser.....	1908	17,250	7-inch	8-12", 16-4"	26.5
Carnarvon....	Armored Cruiser.....	1904	10,850	6-inch	4-7.5", 6-6"	23.0
Cornwall.....	Armored Cruiser.....	1901	9,800	4-inch	14-6"	23.5
Kent.....	Armored Cruiser.....	1903	9,800	4-inch	14-6"	23.0
Bristol.....	Scout Cruiser.....	1911	4,800	none	2-6", 10-4"	26.5
Glasgow.....	Scout Cruiser.....	1911	4,800	none	2-6", 10-4"	26.5
Canopus.....	Coast Defense Ship..	1897	12,950	6-inch	4-35 cal. 12", 12-6"	16.5

GERMAN SQUADRON

Scharnhorst...	Armored Cruiser....	1907	11,600	6-inch	8-8.2", 6-6"	23.5
Gneisenau.....	Armored Cruiser....	1907	11,600	6-inch	8-8.2", 6-6"	23.5
Leipzig.....	Protected Cruiser...	1906	3,250	none	10-4"	23.0
Nurnberg.....	Scout Cruiser.....	1908	3,450	none	10-4"	24.0
Dresden.....	Scout Cruiser.....	1908	3,600	none	10-4"	24.0

The Germans fought it out with characteristic courage to the very end, the *Scharnhorst* going down by the stern, with the admiral's flag flying from the main yard. The *Gneisenau* went under a little later; and after a spirited action the *Glasgow*, which was in the Chilean fight, sunk the *Leipzig*. Subsequently the *Nurnberg* was overtaken and sent to the bottom. The *Dresden* escaped and is still at large.—*Scientific American*, 1/2.

ADMIRAL STURDEE'S COMMENTS.—Some interesting sidelights on the sinking of four of the five German cruisers of Admiral von Spee by the British squadron under Admiral Sturdee off the Falkland Islands, December 8, were shown by Admiral Sturdee when entertained ashore at Montevideo, Uruguay, December 21. The statement that it was probably a running fight is borne out by Admiral Sturdee. In the course of some remarks the Admiral said: "We were grimy from coaling when the Germans were sighted aproaching. I made the signal to get up steam. Then we had breakfast. Everybody washed up. The British were fresh and clean and ready for the fight by the time we began to get close. We divided our squadron. Then the pursuit began. It was a pursuit, because when the enemy found they were up against it they made off. We steamed away after them at twenty knots. It was six hours before we came within range. When the Germans saw there was no escape they turned and accepted the inevitable. We sank the flagship *Scharnhorst* at one o'clock, and the last of their squadron to participate in the engagement at six o'clock. This was the *Leipzig*. The *Glasgow* sank her. The *Dresden* got away.

Providence gave us the opportunity. We had only a small fleet and had been in the Falklands only twenty-four hours. The Germans went down bravely with their colors flying." Admiral Sturdee explained that the *Nürnberg*, which fled when the battle started, was overtaken and sunk by the *Kent*. He declared that the British squadron had suffered eight men killed and fourteen wounded in the battle. The *Invincible* showed signs of having been struck six times. About one hundred German sailors who were saved during the fighting sailed from Montevideo as prisoners December 21 for England, on board the steamer *Crown of Galicia*. They arrived in port December 20 on the British cruiser *Invincible*. The flagship *Invincible*, of the British fleet, cleared for Chilean waters. Cables say that the *Glasgow* and *Cornwall* are now searching the Chilean coast for the *Dresden*.—*Army and Navy Journal*.

THE FALKLANDS VICTORY.—From South American sources some further particulars concerning the battle on December 8 have come to hand. The principal information contained therein is in regard to the composition of the British force, it being disclosed for the first time that Sir Doveton Sturdee had with him two battle cruisers of the *Invincible* type. The following *précis* of the additional information is quoted for the *Globe:*

"The policy of secrecy by which the Admiralty outwitted the German Intelligence Department was the immediate cause of the enemy's disaster. Vice Admiral Sturdee's squadron reached Port Stanley, Falklands, on December 7, and proceeded at once to coal. The two battle cruisers ran to a place of concealment in an adjacent bay, which was ringed in by high hills, and the rest of the squadron placidly awaited the foe. In company with the *Prinz Eitel Friedrich*, an armored merchantman which was said to have 3000 German troops on board for the purpose of landing to seize the coaling station, Vice Admiral von Spee's squadron arrived off the port on December 8. Faced apparently with only five cruisers, less modern than his own ships, and one old battleship, the Germans decided to engage, and a furious action ensued. For a while the engagement was evenly contested, but suddenly the two battle cruisers hove in sight. Perceiving the trap, the German Admiral gave the order for his ships to scatter, but they had already been drawn within range, and a running fight was the only possibility. Both the *Scharnhorst* and *Gneisenau* directed broadsides against the *Invincible*, but without appreciable effect, although several shells exploded on her decks. The heavy guns of the British flagship were used with deadly effect, however, and after five hours the *Scharnhorst*, which was ablaze, sank. The *Gneisenau*, whose crew sang patriotic songs while working their guns, also made a gallant fight, but only survived her sister ship two hours.

"Meantime the *Glasgow* engaged the *Leipzig* for two hours, compelling her at last to hoist the white flag. A regrettable incident followed, for when the pinnaces of the *Glasgow* were well on their way to rescue the *Leipzig's* crew, a shell exploded on the deck of the *Glasgow*, whose gunners replied with a broadside that completed the work of destruction. It is but fair to add the British officers incline to the opinion that this last shot from the *Leipzig* was accidental. The *Glasgow* thus secured an ample revenge for her battering off Chile. The *Nuremberg* was pursued by the *Kent* and *Cornwall*, and was also soon useless, although her commander refused to surrender. It was his stubborn resistence to the end which permitted the escape of the *Dresden* and *Eitel Friedrich*."

The full list of ships engaged in the destruction of the German squadron is reported to be the *Invincible* and *Inflexible*, battle cruisers; *Canopus*, battleship; *Kent*, *Cornwall*, and *Carnarvon*, armored cruisers; and *Bristol* and *Glasgow*, light cruisers. The *Canopus* was acting as guardship when the Germans arrived off Port Stanley, and is said to have begun the action with them. The battle cruisers then came out, and after a chase accounted for the *Scharnhorst* and *Gneisenau*, the *Glasgow* for the *Leipzig*, and the *Kent*

for the *Nuremberg*, while the *Cornwall* and *Glasgow* are reported to have gone after the *Dresden*, which escaped to Puenta Arenas and thence into the Pacific. In a speech at Montevideo on Christmas Eve, Admiral Sturdee, in returning thanks for the reception given him by the British colony, is represented as having said that the Germans fought well, that the battle began at one o'clock, and that the *Scharnhorst* sank at six. "Unfortunately," he added, "the German admiral, his two sons, and his whole ship's company perished. War is a sad thing. His ships were threatening trade. It is a good thing they are at the bottom of the ocean."—*Army and Navy Gazette*, 1/2.

GERMAN AND BRITISH NAVAL STRENGTH

To the Editor of the Army and Navy Journal.—Having been asked by a number of American friends to give my opinion on the mutual strength of the German and English squadrons in the two sea fights off Coronel and the Falkland Islands, I take the liberty to offer you the following compilation, the figures indicating weight of broadside in kilograms:

OFF CORONEL

German Ships		*British Ships*	
Scharnhorst	888	Good Hope	707
Gneisenau	888	Monmouth	408
Leipzig	80	Glasgow	161
Dresden	96		
Total	1,952	Total	1,276

OFF FALKLAND ISLANDS

German Ships		*British Ships*	
Scharnhorst	888	Invincible	3,084
Gneisenau	888	Inflexible	3,084
Leipzig	80	Canopus	1,852
Nürnberg	80	Cornwall	408
Dresden	96	Kent	408
		Carnarvon	408
Total	2,032	Glasgow	161
		Bristol	161
		Total	9,566

Therefore, the German force in gunfire off Coronel was fifty-three per cent greater than the English, and the English force off the Falkland Islands was 371 per cent greater than the German; in other words, the British superiority in the second fight was seven times greater than the German superiority in the first fight.

It remains to add that the fight off Coronel was decided after only fifty-four minutes, whereas the battle off Falkland Islands lasted at least five hours. Finally off Falkland Islands the *Scharnhorst* and *Gneisenau* were short of ammunition because of their preceding fight off Coronel and the impossibility of having filled up their magazines for the new fight.

It has become known by Vice Admiral Sturdee that the *Gneisenau* had completely exhausted her ammunition when she sank, refusing to surrender, and her crew went down singing patriotic songs.

K. BOY-ED,
Captain Imperial German Navy, Naval Attaché.

NEW YORK, December 28, 1914.

—*Army and Navy Journal*, 1/2.

BATTLE LONG EXPECTED.—For more than a month the naval world had been expecting news of the battle between Admiral von Spee's ships and

the British or Japanese, or perhaps the united fleets of those two nations.

A communiqué of the British Admiralty on November 15 said: "Searching for these German vessels and working in concert, under various commanders-in-chief, are upward of seventy British, Japanese, French, and Russian cruisers, not including auxiliary cruisers. Among these are a number of the fastest British cruisers."

On November 3, following the battle off Chile, the *Gneisenau, Scharnhorst,* and *Nürnberg* were reported to have anchored in the harbor of Valparaiso, Chile. Six days later the cruiser *Glasgow* and the transport *Otranto,* the only survivors of Sir Christopher Cradock's squadron, were reported from Santiago, Chile, to be bound through the straits of Magellan for the Falkland Islands. On November 13 there were rumors of a Japanese squadron in the vicinity of Valparaiso, searching for Admiral von Spee's ships.

On November 14 a cablegram from Valparaiso announced that the *Gneisenau, Scharnhorst, Nürnberg, Dresden,* and *Leipzig* had taken on coal at that port and that they had sailed that day. Two days later the British cruiser *Glasgow* was reported coaling at Rio de Janeiro.

On November 28 a dispatch from Buenos Aires said that a squadron of ten British ships had been sighted off the Uruguayan coast, steaming full speed south, while on the same day from the South Pacific came a report that another squadron of ships, supposedly Japanese, had been sighted at Iquique, Chile. That was the last news of the squadrons up to yesterday, when the British victory was reported.—*N. Y. Times.*

THE "ORTEGA'S" ESCAPE.—Excerpts of letter from the British Consul-General at Rio de Janeiro to Sir Edward Grey, published by the Secretary of the Admiralty:

"The *Ortega* sailed from Valparaiso with some 300 French reservists on board. When she had arrived close to the western entrance to the Straits of Magellan, a German cruiser of the *Dresden* class suddenly appeared and gave chase. Be it remarked that the normal speed of the *Ortega* is only some 14 knots per hour, whereas the speed of the German cruiser was at least 21 knots per hour. Under these circumstances the master of the *Ortega* took an heroic resolve. He called for volunteers to assist in stoking his vessel: that appeal met with hearty response; firemen, engineers, and volunteers, stripped to the waist, set to work with a will, and the master assured me that they actually succeeded in whacking the old ship (she was built in 1906) up to a good 18 knots. The master headed his ship straight for the entrance of a passage known as Nelson's Strait, and he made for the strait at full speed, hotly pursued by the German cruiser, which kept firing at him with two heavy bow guns. Luckily, none of the shots took effect, and the *Ortega* succeeded in entering Nelson's Strait, where the German cruiser did not dare to follow her. When it is remembered that Nelson's Strait is absolutely uncharted, and that never before had a vessel of any size attempted that most perilous passage, it will I think, be admitted that the captain's action in taking an 8000-ton steamer safely through that passage constitutes a most notable feat of pluck and skillful seamanship.—*Army and Navy Gazette,* 10/28.

WORK OF GERMAN COMMERCE DESTROYER.—The German steamship *Otavi* landed at Las Palmas, Canary Islands, January 5, 1915, 100 sailors transferred to her by the German auxiliary cruiser *Kronprinz Wilhelm,* representing the crews of four French and British vessels captured and sunk. The craft which fell into the hands of the German cruiser were the French steamer *Mont Agel,* which was sunk on December 4; the British steamer *Bellevue,* sunk on the same day; the French sailing vessel *Annie Marie,* sunk on September 17, and the French ship *Union,* sunk on November 22.—*Army and Navy Journal,* 1/9.

"KARLSRUHE" OFF HAYTI.—The German cruiser Karlsruhe is now reported as having received supplies at Mole Saint Nicolas, Hayti, and

that she has been operating in that vicinity in destroying commerce of the Allies is very likely. The report from Port au Prince stated that the *Karlsruhe* had established a base at the Mole and that hired steamships from New York City and New Orleans have been taking coal and provisions there for the German war vessel, which has been calling for them when necessity demanded it.—*Army and Navy Journal*, 1/9.

"KARLSRUHE" STORIES.—Lamport and Hull's steamer *Van Dyck* was seized by the *Karlsruhe* while on passage from Buenos Aires to New York on October 26. The following picture is drawn by the *Daily Telegraph* correspondent after interviews with the *Van Dyck's* passengers and crew:

A lieutenant from the *Karlsruhe* comes alongside the captured vessel and expresses regret that the fortune of war compels him to divert the vessel from her course, and temporarily detain all passengers. He then ascends the gangway with the marines, bows to everybody, expresses regret that the *Karlsruhe* is obliged to interfere with anybody's convenience. After going to the purser's office and taking all the loose cash there, the lieutenant, in the case of the *Van Dyck*, returned to the deck and gave back to the passengers articles of value which had been handed to the purser for safe custody. The cruiser's officers and marines distributed picture postcards of the *Karlsruhe* among the *Van Dyck's* passengers, and freely admitted to them that they expected to be vigorously hounded by the British cruisers after they had sunk the *Van Dyck*. They were prepared to fight, they declared, if evenly matched, but would seek a haven along the coast of the United States if pursued by superior numbers. They had captured or sunk fourteen merchant vessels, and were prepared to come north to the transatlantic lanes, and try their luck at sinking a big Cunarder, White Star, or French liner.

From the captain of the *Asuncion*, which appears to be one of the *Karlsruhe's* tenders, the *Van Dyck's* people learnt that the German cruiser is constantly accompanied by four captured merchant vessels, manned by prize crews. The flotilla generally spreads over a line 150 miles long. When a vessel flying an enemy's flag is sighted, word is given by wireless, and away dashes the *Karlsruhe* after the prize. It appears that the four tenders are the *Farn*, *Indrani*, *Rio Negro*, and *Asuncion*, the two latter being Hamburg-American steamers.

"LA CORRENTINA'S" FATE.—The Admiralty is stated by Lloyd's to have received a telegram from Montevideo stating that the vessel was captured by the auxiliary cruiser *Kronprinz Wilhelm*, 270 miles east of Lobos Island, at 8 a. m., on October 7. The British steamer was bound from La Plata for Liverpool. A Lloyd's message from Montevideo states that the Norddeutscher-Lloyd steamship *Sierra Cordoba* has arrived there and landed all her passengers and the entire crew of *La Correntina*, also the crew of the French bark *Union*, excepting the master, mate, and apprentice, who are imprisoned on board the *Kronprinz Wilhelm*. The latter stopped *La Correntina* on October 7, when she transferred all the passengers and crew, subsequently transhipping part of the cargo, coal, and stores, till October 14, when *La Correntina* was sunk. The *Sierra Cordoba* hove in sight on the 20th and the passengers and crew were transferred on the 22d. The *Kronprinz Wilhelm* left on the 24th, returning on November 1, towing the *Union*, from which she proceeded to bunker. The *Sierra Cordoba* departed on November 8, returning on the 13th to the *Kronprinz Wilhelm*, which was still transhipping coal. On the next day the *Sierra Cordoba* left for Montevideo. The *Union* was captured on October 28, latitude 34 S., longitude 52 W.

THE JAMAICA CABLE.—The Colonial Office on Monday issued extracts from a despatch, dated October 20, received by the Secretary of State from the governor of Jamaica, in which he announces that in Jamaica affairs have

proceeded normally. There was an interruption of cable communication with Jamaica early in August last. As the interruption took place at 6.40 a. m., on August 3, within fifteen minutes of an earthquake shock felt in Kingston, the breaking of the cable was at first attributed to natural causes. The governor reports, however, that it has been ascertained by the captain of the cable repairing ship that the cable was unquestionably cut, not severed by the earthquake. Hostile cruisers had been in the neighborhood of Jamaica a few days before the war. It will be noticed that the cable was cut before the declaration of war.—*Army and Navy Gazette*, 11/28.

CAMEROONS OPERATIONS.—A summary of the operations in Nigeria and the Cameroons was issued, compiled from reports received by the Colonial Office up to November 19. It contained the following naval references:

On October 26 a French force under Col. Mayer, with the co-operation of a British naval and military force, occupied Edea, a town on the Sanaga River, and an important station on the railway from Duala. On November 13 preparations were completed for extensive operations to the north and northwest of Duala.

After a bombardment by the French cruiser *Bruix* and the Nigeria Government yacht *Ivy*, a force of Royal Marines seized and occupied Victoria, the seaport of Buea, the seat of the German Colonial Government. On the same day a column advancing along the Bonaberi railway from Susa drove the enemy north and occupied Mujuka, a station about 50 miles from Bonaberi. Meanwhile large allied naval and military forces advancing from different points proceeded to occupy Buea. The occupation was effected on November 15, the enemy being scattered in all directions.

It is interesting to note that the British authorities in West Africa find it not less difficult than those elsewhere to distinguish dangerous enemy subjects from those more peaceably inclined. It has transpired that the German who attempted to blow up his Majesty's ship *Dwarf* with an infernal machine was a missionary, who, when questioned as to how he found such an action compatible with his profession, replied that he was a soldier first and a missionary afterwards.—*Army and Navy Gazette*, 11/28.

MISCELLANEOUS NOTES

"CORMORANT" INTERNED

WASHINGTON, December 15.

The *Cormorant*, a converted cruiser of the German Navy, was to-day interned at the American naval base at Guam with 22 officers and 355 men, and will be held there until the close of the war in Europe. The *Cormorant's* captain decided to intern when informed that he would not be allowed to take on more than 100 tons of coal from the American Navy's coal pile at Guam.

A cable message received by the Navy Department to-day from Captain W. J. Maxwell, the Governor of Guam, timed 5 p. m. yesterday, reported that the *Cormorant* entered Guam at 11 o'clock yesterday morning short of coal, provisions and water, and asked 1500 tons of coal. One hundred tons of coal were offered and provision for the immediate need of fresh water. The commanding officer was told to choose between leaving port within 24 hours or interning. He had until 10 o'clock this morning to decide. The Navy Department approved the governor's action and instructed him not to allow the vessel more coal and provisions than could be properly spared.

Late this afternoon Secretary Daniels was notified by Captain Maxwell that the commander of the *Cormorant* had decided to allow the vessel to be interned. When asked why not more than 100 tons of coal would be allowed, Secretary Daniels replied that there was only government coal at

Guam, and that the amount sought by the *Cormorant's* captain could not be spared.

Little is known of the *Cormorant* here, except that she is a converted cruiser of 5000 tons displacement, acquired by Germany from Russia. Information as to how Germany acquired the vessel from her present enemy is not obtainable. It is supposed the ship has been employed by the Germans as a destroyer of commerce in the Pacific.

At first this vessel was believed here to be the unprotected cruiser *Cormoran,* a vessel of only 1600 tons displacement, but Captain Maxwell's later message announcing the decision of the craft to intern corrected that impression.

This is the second German warship to interne in American waters since the outbreak of the war. The other, the *Geier,* interned at Honolulu some time ago. The officers and men of the vessels will have to remain interned until the close of the war unless the Allies consent to their parole.—*N. Y. Times,* 12/16.

PORTSMOUTH HARBOR REGULATIONS.—The King's harbormaster (Captain C. E. Tower, R. N.), issued a "Notice to Mariners," containing very stringent regulations as to merchant ships' movements inside of Portsmouth harbor, a great feature of which is that any breach of such regulations may lead to the offending vessel being fired on without warning and instantly sunk. Among other things, it is laid down that no craft of any kind are to be under way between the firing of the sunset and the daylight gun from H. M. S. *Victory,* except such as are specified, while during fog, or thick weather by day, no vessels of any description are to be under way. At night all merchant craft, barges, motor boats, pulling boats, punts, etc., are to be moored either in the Camber, on the Portsmouth side of the harbor, between the Hard and the Coastguard Station on the Gosport side. The steam launches plying between Portsmouth and Gosport are restricted to a certain area. During daylight hours all ships or boats moving in or out of harbor are to have passes supplied by the naval authorities, while those using the Fareham Creek or Flathouse quays cannot do so unless convoyed by patrol boats, whose times for doing so are notified daily. No boats or vessels of any kind are permitted to approach any of his Majesty's establishments or ships, and disobedience of this order renders the offenders liable to be fired on. All traffic in Haslar Creek (near the submarine creek) and Clarence Victualing Yard Creek is prohibited.

On Saturday the boom defence was placed across the entrance to Portsmouth harbor, which has from that time been closed to all merchant traffic, so that the Isle of Wight steamers cannot now enter the harbor either by day or by night, and the island traffic has consequently to be worked from the Clarence Esplanade Pier, on Southsea Beach. The fixing of the massive sections of the boom, each of which bristles with stout steel spikes, was watched by a large number of people. There is a "gateway" in the center of the boom, which can readily be opened, but it will only be available for his Majesty's ships and such other vessels as receive special permits to use it. On the same evening the examination service was put into operation, not as a mere test, but under actual war conditions, and all vessels bound for either Southampton or Portsmouth harbor were compelled to proceed to the examination anchorage, in Sandown Bay in fine weather, or in St. Helen's Roads in rough weather. There they were examined, and given instructions as to proceeding either to Southampton or to Portsmouth harbor. Another precaution was that merchant ships were required to disconnect their wireless apparatus, and the Needles passage being permanently closed, all ships had to enter and leave the area by the eastward passage only. All movements of vessels by night or during foggy weather within the area, were strictly forbidden.—*Naval and Military Record,* 8/4.

BUILDING OF DREADNOUGHT "ZEPPELINS."—In a recent issue the *Chicago Tribune* published an article from its special correspondent at Geneva, which gave particulars of German activity in the building of *Zeppelins*. According to the *Tribune* correspondent the type of airship which is now being built is 400 yards long, 14 yards broad, with a crew of 30 officers and men. These dreadnought *Zeppelins* are said to be meant for the invasion of London, which is, we are informed, to take place "early next year." Eighteen to twenty *Zeppelins* of the latest type are believed to be required for this invasion, and when the *Tribune* correspondent wrote on November 20, seven of these were understood to be ready.

The following is the article referred to:

Germany is slowly but steadily preparing to make its threatened aerial attack on London and on the eastern coast of England, even without the aid of the German Navy, in the judgment of observers of the continued activity at the *Zeppelin* works at Friedrichshafen.

At this factory, on Lake Constance, over 1000 workmen since the beginning of the war have been employed in the construction of dirigible balloons, instead of a normal working force of 400 men. In place of the usual working period of eight hours a day, the men, who are all experts, have been divided into day and night shifts of 12 hours each, so that over 500 are always engaged. All the finished materials and fittings, as well as sections of the airship envelopes arrive from other parts of Germany ready made, and the workmen at Friedrichshafen have only to put them together. This makes it possible to build a *Zeppelin* in three weeks.

The latest and strongest *Zeppelin* ever built sailed to the north November 5, direct from the Friedrichshafen works without any previous trial trips. It is 400 yards long, considerably longer than its predecessors, about 14 yards broad, and its motive power consists of three motors of 800-horsepower. It carries a crew of 30 officers and men.

In a special basket this *Zeppelin* carried 50 torpedo-bombs, each said to be capable of as much damage as the shells of the famous 16-inch guns. One of these bombs, during a trial near Friedrichshafen, penetrated the earth five yards. All the *Zeppelins* built since the beginning of the war have been similarly armed.

Dreadnought *Zeppelins* were launched August 15, September 3 and 24, October 15, and November 5, and two others of the same type at the beginning of August, making a total of seven. These formidable aerial vessels are said to be able to resist successfully any aeroplane attack. They can "sail" with a weight of two or three tons; they have 17 to 18 independent gas compartments, and water-planes that will allow them to land on water, if necessary, and continue their flight later. At Friedrichshafen they are called "marine airships," and in small letters on their hulls are painted the significant words "meant for London." Officially in Germany there have been built up to the present 31 *Zeppelins*, but only the most recent dozen count with the military authorities.

The German Staff and Count Zeppelin are understood to hold the opinion that 18 to 20 *Zeppelins* of the latest type are necessary for a successful attack on London, and this number is expected to be ready early next year.

All the latest airships carry several machine guns on special platforms and one large gun each.—*London Times*, 12/26.

SELBORNE ATTACKS BRITISH ADMIRALTY

LONDON, January 7.

The Marquis of Crewe announced in the House of Lords to-day that it was the definite opinion of the British Admiralty that the battleship *Formidable* had been sunk by two torpedoes discharged by a submarine.

The Earl of Selborne, formerly First Lord of the Admiralty, in an address in the House of Lords, had described the dispatch of Sir Christopher Cradock's squadron to the Pacific as a blunder, as the squadron, he

said, was wholly incompetent for the task assigned to it—that of destroying the German warships there. He then asked for more information concerning the loss of the battleships *Formidable* and *Bulwark,* and data about other naval operations.

The Marquis of Crewe said he could not add anything to what Winston Spencer Churchill, First Lord of the Admiralty, had said in the House of Commons. Before adjournment, however, the Marquis said that in the opinion of the Admiralty the *Formidable* had been struck by two torpedoes fired by a submarine. He added that the captain of the *Formidable* had sent signals to the other ships not to stand by, which was taken to mean that submarines were in the vicinity and that they might suffer the same fate as his ship.

There were now only two German cruisers and two armed merchantmen to carry on commerce raiding, the Marquis of Crewe said, and they could not long escape the Allies' ships. The manning of new ships, including monitors, he added, had been completely provided for.

MONITORS AND UNDERWATER ATTACK.—The *Westminster Telegraph and Post* gives to First Lord Winston Churchill great credit for securing the Brazilian monitors which are doing such excellent service off the coast of Belgium. "These are," it tells us, "vessels of extraordinary efficiency. They cost probably not much more than three large destroyers—say £150,000 each. Consider the return for this outlay. Each monitor displaces about 1250 tons, and is so flat, drawing only 4½ feet of water, that she can go right into shoal water and fire. About one-third of the displacement is represented by her armor; in other words, she carries just over 400 tons of protective material, defending her sides and her guns. She mounts, moreover, an armament of two 6-inch guns with a 100-pound shell, two howitzers with a 45-pound shell, four 3-pounders and six rifle caliber guns. When she comes across an enemy ship—or a German trench near the sea for that matter, as we know—she can discharge every minute one and a half tons of metal.

"Nor is this all. She has a speed of 11½ knots and carries sufficient coal to enable her to travel 4000 miles at an economical rate of steaming; she could go, in other words, from Dover to New York and still have some fuel in hand. If oil instead of coal were employed—supposing the Admiralty were ordering more of them—then the speed could be increased and the radius of action raised probably by about fifty per cent, enabling her to go to New York and back again from Queenstown.

"These remarkable ships were, of course, built for service on quiet, peaceful rivers. It was never imagined that they would traverse the sea more than once—on their way to Brazil. Yet here we have them on the eve of winter operating in one of the most choppy seas and holding their own. Those who were present at the trials were not surprised by this success, though others may have been. When one of them was being tested the water was so rough that 5000-ton merchant vessels had to seek shelter; the monitor, built for river work, held her own.

"These ships even defied the enemy's submarines the other day. Their immunity under attack was no doubt due to a technical difficulty which balked the enemy. As a rule his torpedoes are set to run about twelve feet below the surface; the monitors are submerged only four and a half feet, and consequently the ten torpedoes fired passed under them without doing any damage. Of course, the immunity is not complete; torpedoes can be made to run at almost any depth. But it takes time, when they are adjusted to one depth, to change over to another.

"The monitors are ships which may rival in the history of the present war the career of the original *Monitor.* Their careers have begun auspiciously, and we may consider it a most fortunate coincidence that when war broke out they were complete and ready for sea. Mr. Churchill had merely to arrange with the government that they should be purchased; and

forthwith they hoisted the white ensign. After their intervention on the Belgian coast when, as reported, their shells played terrible havoc among the Germans, their subsequent careers will be watched with keen interest."—*Army and Navy Journal.*

SWIMMING COLLARS FOR BRITISH SAILORS

LONDON, October 19.

That the Admiralty is fully alive to the necessity of providing a means for the crews of warships that strike mines or are blown up by submarines to escape drowning, since other warships are not allowed to go to their assistance, is shown by the announcement to-day that the Admiralty is arranging for a general supply of swimming collars to be distributed to the officers and men of the fleet.

The men are ordered to carry the collar when they are awake and the device is to be kept inflated and near each individual when he is asleep.—*N. Y. Times,* 10/20.

THE DAY OF THE SUBMARINE.—In reply to a question as to whether the day of large ships was over, Admiral von Tirpitz said:

"It is difficult to draw conclusions just yet. It is unquestionable that submarines are a new and powerful weapon of naval warfare. At the same time one must not forget that submarines do their best work along the coasts and in shallow waters, and that for this reason the Channel is particularly suitable for these craft. The successes which have been achieved hitherto do not warrant the conclusion that the day of large ships is past. It is still questionable whether submarines would have made such a fine show in other waters. We have learnt a great deal about submarines in this war. We thought they would not be able to remain much longer than three days away from their base, as the crew would then necessarily be exhausted. But we soon learned that the larger type of these boats can navigate round the whole of England and can remain absent as long as a fortnight. All that is necessary is that the crew gets an opportunity of resting and recuperating, and this opportunity can be afforded the men by taking the boat into shallow and still waters, where it can rest on the bottom and remain still in order that the crew can have a good sleep. This is only possible where the water is comparatively shallow."

Admiral von Tirpitz's interviewer parenthetically remarks that it is an open secret that Germany is building 40 new submarines of the 900-ton type.

In Admiral von Tirpitz's opinion a submarine war against British merchant ships would be more effective even than an invasion of England by means of *Zeppelins.*

"Will the German Navy come out to fight the British fleet?" "Certainly," Admiral von Tirpitz replied.

"If the British give us an opportunity to engage them. But can it be expected that our fleet, the strength of which is only about one-third of that of the British fleet, will seize an opportunity unfavorable in the military sense and challenge the British fleet to fight? As far as we know the British Grand Battle Fleet is lying off the west coast of England in the Irish Sea.—*London Times,* 12/24.

BIG SHRAPNEL SHELL ORDER.—The Westinghouse Company has received a $750,000 order for 152,000 shrapnel shells, of which 100,000 are of the smaller variety, from the Washington Ordnance Company of Washington, D. C., with instructions to ship the order with all speed. The local manufacturing company states that it does not know the ultimate destination of the shells.—*New York Sun,* 1/4.

PRIZE MONEY.—The first sale of German ships, captured since the outbreak of the war, on order of the British prize court, was held at London,

January 5, when four vessels were knocked down for a total of $653,875. This sum will be divided among the whole navy. Previous to the war prize money of this description was divided only among crews making the capture.

Lieutenant Sauerbeck, Lieutenant Pretzel and two seamen of the German gunboat *Geier*, interned at Honolulu, who recently were arrested in San Francisco, Cal., while on their way to San Diego, were released from arrest January 5 by order of Secretary of the Navy Daniels. They were directed to report by mail or otherwise each month to Rear Admiral Charles F. Pond until the termination of the war.—*Army and Navy Journal*, 1/9.

THE PORTUGUESE FLEET.—Portugal must now be regarded as one of the combatants. Great Britain and Portugal are united by a treaty which is the oldest in existence. The monarchy having been replaced by a republic, some doubt may have existed as to whether Portugal still considered herself involved when we went to war. Germany has solved the problem by making war upon Portuguese oversea colonies, and thus this country enters the ring. The immediate result of this development is of some interest. In the first place, there are thousands of tons of German shipping in Portuguese harbors—they will now, of course, become prizes of war. In the second place, the German cruisers which are still at large will be unable to use Portuguese ports and enjoy the limited hospitality which a neutral nation may offer to a belligerent. In the fourth place, the Portuguese fleet will apparently become available to co-operate in the near seas. Unfortunately, owing to a combination of circumstances, the naval program which was under consideration when the monarchy was overthrown, and which was recast by the republican government, has never been carried into effect. The consequence is that Portugal possesses only one small battleship, of about 3000 tons displacement. She was completed at Blackwall in 1878, and reconstructed at Leghorn eleven years ago. She is well armored, and, although slow, mounts two 8-inch, four 4.7-inch and a number of smaller guns. Unfortunately, though of small displacement she is of considerable draft, drawing over 18 feet, otherwise she might have proved most useful in the operations on the Belgian coast. But, though weak in armored ships, Portugal possesses four cruisers and two gunboats, which ought to prove quite useful if they can be manned and sent to sea with trained crews. The republic's navy is, unfortunately, very weak in torpedo craft; indeed, it possesses only one destroyer, built twelve years ago, and four Yarrow torpedo-boats, which were constructed in the 'eighties, and are probably now of little use. Portugal, in the circumstances, cannot render much naval assistance to the Allies, but it is possible that useful duties may be assigned to her cruisers, and it is in cruising ships that the Allies are particularly weak.—*Naval and Military Record*, 11/4.

PORTUGAL

LISBON, October 24.

(Delayed in transmission)

It is announced that German troops have invaded the province of Angola (Portuguese West Africa).

Portuguese warships and troops will be sent thither from Portugal immediately.—*Reuter, Naval and Military Record*, 11/4.

CENTRAL AFRICAN FIGHTING.—Reuter's Agency is informed that the scene of fighting between Belgians and Germans in Central Africa, in which the latter were completely defeated, is to the south of Tanganyika, near to where the borders of the Congo State, Northern Rhodesia, and German East Africa meet.

For some time a strong force of Belgians has been concentrated on the southeastern corner of the Belgian Congo, where, in co-operation with the

British, they have been blocking the advance of the Germans into the Chartered Company's territory and into Katanga.

THE END OF FINLAND.—That the "Finis Finlandiæ" so often spoken of by Russian reactionaries should be planned anew at this time of Allied battle for small nations has naturally alarmed English sentiment. The publication by the Russo-Finnish Committee—a body composed of high officials, working with the sanction of the Czar—of a program of legislative measures for Finland, has been taken by some as purely academic; but others will not dismiss it so lightly. The program is the result of many years' work; it gives practical form, moreover, to some of the more general measures passed by the third Duma in 1910 to restrict Finnish liberties. According to a Danish correspondent of the London *Nation*, its "adoption *en bloc* when laid by the Czar's ministers before the present Duma is a foregone conclusion, a mere matter of form." By it the laws regarding the Russian press, societies, and meetings are to be extended to Finland; all officials are to be removable by Russian authorities; all schools and the Helsingfors University are to be placed under the Petrograd Ministry of Education; and preference for Russian goods is to be established. The Russian author, M. Lebedeff, takes the more hopeful view that the Duma, more liberal than in 1910, will reject the legislation. But there is no doubt of its submission, and this fact alone is disturbing at a moment when it was beginning to be hoped that the war promised to better Russian governmental policy—*The Nation*, 12/24.

BALKAN DEVELOPMENTS.—A development of the utmost importance in the situation in the Balkan states was the announcement of the Bulgarian minister at Petrograd on December 22 that an agreement had been reached between Roumania and Bulgaria under which Roumania would restore to Bulgaria the province of Dobrudja and most of the other territory which she acquired from Bulgaria as a result of the second Balkan War. At the same time the Bulgarian minister announced that his country would continue to be neutral, and expressed the belief that Roumania, "although she has no cause to fear us," would do the same. The importance of this announcement is that it sets at rest all doubts as to the intentions of Bulgaria, and disposes of a possible source of danger to the Allies. The way to western Europe is now definitely closed to the troops of the Sultan. Irrespective of any action with regard to the war that may be taken by Roumania or Greece, Bulgaria will remain neutral. Whether the announcement portends a change of attitude on the part of Roumania and her approaching participation in the war is not so clear. If she is determined to satisfy her Transylvanian aspirations by force of arms, she is at liberty to do so so far as Bulgaria is concerned. At any rate it may be taken for granted that her surrender of the newly acquired province is not dictated by motives of pure philanthropy, and it is possible that she has received from the Allies the promise of a *quid pro quo* when the time comes for the division of the Austrian spoils. The suggestion is obvious, however, that that time, if it is to come at all, might be appreciably hastened were Roumania to join the Allies.—*The Nation*, 12/24.

BRITISH COMMENT ON AMERICAN NOTE.—On December 28, the American Embassy presented to the British Government a note relating to American foreign trade, and protesting in particular against British restrictions on American trade with neutral countries, and the unnecessary detention of American vessels.

Under the title "A Friendly Remonstrance," the *London Times* comments on the note as follows:

The note is a frank statement of the alleged grievances of America, but though we are confident that a good answer can, and will, be made to them, we admit at once that they are not put forward in a querulous or incon-

siderate spirit. President Wilson and his advisers have been at pains to insist in several passages of the note that they do not advance their claims in any spirit of hostility to us, from any lack of appreciation of the momentous nature of the conflict in which we are engaged, or from any wish to gain undue commercial advantages at our expense. We accept these assurances fully and gladly. They are, as our former article shows, what we should have expected from the great and friendly nation across the Atlantic, between whom and ourselves, the note pointedly observes, cordial relations have existed for so long. Of the sincerity of these expressions there can be no shadow of doubt. It is stamped upon the face of a diplomacy which, like our own, is truthful and straightforward.

The note, as we had supposed, does not question our belligerent rights in principle. They have been too often and too fully recognized by American jurists and statesmen for that. The gist of the complaints it makes is that our "present policy towards neutral ships and cargoes exceeds the manifest necessity of a belligerent, and constitutes restrictions upon the rights of American citizens on the high seas which are not justified by the rules of international law, or required under the principle of self-preservation." These last words are significant. We shall be surprised if issue is not joined upon them in the British reply. Americans cannot doubt that the war is in the highest degree a war for self-preservation upon our part, or that the gradual wearing down of Germany by the exercise of our sea-power is an indispensable element in that self-preservation. We, who are "usually the champion of the freedom of the seas and the rights of trade," are not likely to dispute the general proposition that commerce between neutrals ought not to be interfered with by belligerents "unless such interference is manifestly an imperative necessity to protect their national safety, and then only to the extent that it is a necessity." But we shall doubtless urge that, broadly speaking and with possible exceptions in individual cases, the interference with neutral commerce which we have practiced comes within the terms of this recognized limitation of general neutral rights. The note, it will be seen, protests against our refusal to guarantee from molestation American copper consigned to Italy. Copper, as Americans know, is as absolute a necessity to belligerents as gunpowder. The American figures themselves show that the American exports of copper to neutral countries, bordering on the territories of our enemy, increased from less than 10,000,000 pounds to more than 52,000,000 pounds in the months of September and October, 1914, as compared with the same months a year ago, and that those to Italy alone rose from 6,800,000 pounds to 25,000,000 pounds. Does not the fact create a reasonable presumption that much of it was at one time being smuggled into Germany and Austria, whatever the case may be to-day? Is it not a manifest necessity of self-preservation that we should reserve to ourselves the right of scrutinizing closely exports of the kind?—*London Times*, 1/1.

A BRITISH SIDELIGHT ON GERMANY'S NAVAL STRATEGY AND ENGLAND'S COUNTER STRATEGY.—On August 1 and down to August 3, be it remembered, the conviction was still almost unanimously held in Berlin that Great Britain, crippled by the Irish question and lured into inaction by the pacificist smugness and Teutonizing *Sittlichkeit* of a certain section of our Cabinet, would remain neutral in the face of the proffered undertaking from the Kaiser's Government that our Channel population's peaceful slumbers would not be disturbed by any German bombardment of France's northern coast. Accordingly, on that same date, August 1, the German High Seas fleet, *minus* the squadron considered necessary to cope with any attempted raid by the Russian Baltic fleet upon the German ports, was assembled in its favorite waters off the coast of Norway, awaiting, not the British Fleet, but the expected British intimation of neutrality, before circling round the northern section of these isles, and thence proceeding in a southerly direction towards France's

western seaboard. Here a bombardment or blockade of the chief harbors could have been effected by a portion of the High Seas fleet, pending the possibility at a later stage of landing a strong expeditionary force, which would have compelled the French commander-in-chief to disseminate his armies in order to oppose a German invasion on two fronts.

Concurrently, the remainder of the German High Seas fleet was to have rallied the *Goeben* and her light cruiser escort in the Western Mediterranean, where, pending a further rendezvous with the Austro-Hungarian and Italian fleets, a preliminary operation was to have been carried out forthwith in the Balearic Isles.

In the early hours of August 2, Prince Louis issued to our Grand Fleet assembled off Spithead the order enjoining them not to disperse, but to proceed in full strength to the North Sea. That memorable order was deliberately published the next morning in the Sunday papers, when Admiral von Ingenohl, duly apprised by wireless of the British move, returned hurriedly with the High Seas fleet from the Norwegian Fiords to Wilhelmshaven. But for the inglorious hesitancy of our Cabinet at this critical juncture, this timely action of our First Sea Lord might have led to a general engagement with the intercepted German fleet in circumstances most favorable to our own. Which engagement, need I remark, would have spared not only Sir John Jellicoe and his valiant tars, but the British people, their present anxious and unceasing vigil! But no; Teutonic *Sittlichkeit* was to prevail for yet another, and, from our navy's standpoint, irretrievable 60 hours. For by delaying by just this period the inevitable declaration of war, the shirkers in our Cabinet robbed the British Admiralty of its one chance of clinching matters without vexatious delay. Still, Prince Louis, on his own initiative, had destroyed the major portion of the hopes built by the German Admiralty upon securing the naval predominance of the Triple Alliance in the Middle Sea.—By "NAUTILUS," *Fortnightly Review*, December.

THE FRENCH NAVY.—In addition to the obvious advantage the French Navy derives from her greater expenditure on realistic long-range battle practice and fleet tactics, she is enormously superior to her Austrian enemy in all-round fighting resources. Besides having ample means of effective blockade by day and by night in the 60 seagoing destroyers and submersibles of his newly reorganized "flottilles d'escadre," Admiral de Lapeyrère opposes to the 48 weapons of 12-inch and 24 of 9.4-inch caliber carried in the three *Tegetthofs* and three *Radetzkis*, which are the only Austrian battleships worth reckoning, the crushing battery of the 144 guns of 12- and 9.4-inch mounted in the four *Barts* and six *Dantons*, without reckoning the nine battleships of the Deuxième Escadre that could be brought into line, and include 15,000-ton *Patries* and 12,000-ton *Suffren-Bouvets*. The French superiority in total displacement and gun-power is in the proportion of three to one. Nor can the Austrians entertain the hope of avoiding an action by the use of runaway tactics. The four *Barts* (two of which are good for 22 knots) are faster than the *Tegetthof* squadron by at least one knot. Moreover, they have in their formidable end-on fire of 32 guns of 12-inch bore an excellent argument against a retreating enemy.

But at the same time, pleased as the French Command is with the superior quality of our ships, it is no secret that the need is being sorely felt of light modern cruisers of the type with which the British Navy is so amply provided, fit to act both as scouts and as mother ships to the flotillas. By using for a rôle of that sort armored cruisers of the *Quinet-Gambetta* type (14,000-12,570 tons), we are running undue risks. The *Waldeck-Rousseau*, for instance, had a very narrow escape of being torpedoed by Austrian submarines, and she owed her safety to her captain's decision and also to her ability in promptly raising her speed to 24 knots. If up to the present Mons. de Lapeyrère's force has been able to make its presence felt in the Adriatic without incurring any loss, despite the activity

of Austrian mining and under-water flotillas, it is due in great part to the valuable experience which the French fleet has gained, in recent years, in frequent blockading exercises round Toulon, Bizerta, and Corsica. Of course, the proximity of Bizerta counts for much in the unimpaired efficiency of the "armée navale" in command of Adriatic waters, and the republic is now reaping the benefit of the substantial additions lately made to the resources of the Tunisian point d'appui that permit in a few days of coaling and refitting operations which would have taken weeks had Toulon been the only base available.

It is interesting to note that whilst being fully able to account for the relatively modest but highly efficient navy of the Dual Monarchy, the "Marine Française" might have been embarrassed in dealing with certain elements of the paper fleet of Turkey, viz., the *Goeben* and the *Breslau*. There is nothing in our navy capable of catching and fighting these 27-knot cruisers, which shows the need of keeping up with progress in all its branches, and justifies the campaign of Mons. Monis and other partisans of the British Lion type. Happily, English battle cruisers more heavily armed than the *Goeben* and in a much better fighting condition (for obvious reasons) will come in with their escort of fast scouts, to fill what might have proved a dangerous gap in France's naval armor. Thus in the Mediterranean the Franco-British alliance is prepared for all eventualities.

In the north, France has vastly increased the number of her ships and torpedo craft in commission which has caused a vice admiral to be appointed to the post of commander-in-chief, up to the present filled by a rear admiral. Vice Admiral Favereau, who is responsible for the utilization of the whole of our northern resources, may be said to be the right man in the right place. He made his mark two years since, when in charge of the Brest Deuxième Escadre Légère, and the efficient defensive force now anew under his command has, owing partly to his energy and fighting spirit, become familiarized with realistic training in all conditions of weather.

Not satisfied with his share of duties at sea, Mathurin is, like his excellent comrade Jack Tar, taking a hand in land fighting, and this with conspicuous success, thus showing once more the amphibious nature of navies and their special defensive value for any country. A strong detachment of seamen are at work in Belgium under Rear Admiral Ronarch, who was specially comemnded by the King of Belgium for his able leadership, and is our youngest flag officer (49), though he is, of course, older than most British rear admirals. At Cattaro seamen are bombarding from the shore Austrian fortifications, whilst in France naval gunners are in charge of the long-range navy guns recently mounted in our camps retranchés with a view to beating German artillery at its own game. Moreover, naval reservists of something like the value of an army corps have been turned over to the army. This reminds one of the 1870 war, when fleetmen, under Admirals La Roncière and Jaurès, gloriously played their part in the defence of Paris and in the last combats "pour l'honneur" round Le Mans.

Among the several interesting lessons of the war, as understood here, is the importance of risking within the radius of action of hostile submarine bases only light craft and the consequent need of more destroyers, and especially of relatively powerful and economical destroyer-catchers of the *Undaunted* class, which are deservedly admired, and are, of course, the terror of German destroyer flotillas. The value of superior speed combined with superior gun-caliber and range is also held to have been fully demonstrated, and the policy England has followed in recent years has been vindicated. The unlucky fate of the *Good Hope* and *Monmouth* in their action against the newer *Scharnhorst* and *Gneisenau* is ascribed to ill-luck, and also to the low batteries, useless in a seaway, which French experts have all along criticized, in the ships designed by the late Sir W. White.

J. B. G.

—*Naval and Military Record*, 11/25.

The French Minister of Marine, M. Auganeur, in speaking of the absence of German commerce from the seven seas, owing to the great preponderance of the Allies' warships, says: "The sea does not exist for the Germans now. The British and French fleets have worked everywhere with the most absolute co-operation. The French have taken their part with the British squadrons in the bombardment of the Belgian coast, where the joint navies assisted materially in the efforts of the Allies' land forces. Just as Mr. Churchill is able to say that the British fleet is relatively stronger compared with the German than at the outbreak of the war, so am I able to assure you that the French fleet is sensibly stronger than it was five months ago. We have lost only two little vessels, a destroyer in the Mediterranean and a submarine the other day in the Adriatic. On the other hand, we have added fresh ships to our fleet. I won't give you the figures of increase, but within several months we shall be still stronger. The whole situation is as good as it is possible to be."—*Army and Navy Journal*, 1/9.

COAL PROBLEM FOR COMMERCE DESTROYERS.—Two extremely interesting facts stand out from the record of Admiral von Spee's ships and from that of the *Emden*. It was believed before this war that a commerce destroyer would have the greatest difficulty in getting coal if it did not belong to a nation with coaling stations throughout the world. But these German vessels had no difficulty whatever in coaling. What troubled them was their inability to obtain ammunition. It is reported that the *Gneisenau* had shot away all her ammunition some time before the end came; and the *Scharnhorst* could not have been much better off, for the two bore the brunt of the action off Coronel. From the official report of the gallant captain of the *Emden* to the Kaiser, it appears that he, too, ran out of ammunition. He then actually turned his vessel towards her pursuer, in the hope of sinking the latter with a torpedo or by ramming her, but in a few minues his funnels were shot away, his steam fell off, and there was nothing left but to run the ship on a near-by reef. The deadliness of these modern battles for the loser appears not only from the fact that, like the *Monmouth* and the *Good Hope*, the *Gneisenau* went down with all on board, but from the official statement that, while about 110 men were killed on the *Emden*, only eight were wounded. The knowledge that scarcely a single German vessel has thus far surrendered under fire, and that the crews have chosen to perish rather than haul down their flag, as did the men of the *Gneisenau*, is producing a tremendous feeling of pride and elation in Germany, where they consider that their navy of only thirty years' standing has proved itself the equal of the British in ability, daring, and a courage which welcomes death for the Fatherland.—*The Nation*, 12/24.

THE SUBMARINE AS COMMERCE DESTROYER.—About 4 o'clock on the afternoon of Monday, November 23, the English steamer *Malachite*, of the Cunard Co., en route to Havre from Liverpool, sighted a German submarine which came suddenly to the surface of the water close to her. The hatches of the English vessel being open the men went on deck at once and the German submarine captain, being within speaking distance of them, told them he would give them ten minutes to take to their boats before he sank their ship. There was nothing for the thirteen men of the *Malachite* to do but to comply with this and, after five hours of rowing, they reached Havre where they informed the authorities of what had happened. From their boats they saw the submarine fire 19 shots at the *Malachite*, which took fire; immediately after which the submarine submerged.

Thursday morning another German submarine sank, six miles off Cape d'Antifer, a second English ship, the *Primo*, collier, going from Newcastle to Rouen. In this case also the commander of the submarine gave

the English sailors ten minutes to embark in a whale boat, after which 30 shots sank the *Primo*. The crew were picked up by another collier and taken to Fécamp.

It is thus that isolated submarines can make war against the enemies' shipping along the coasts. In order to have a wider radius of action they would have to be larger and operate in the manner of cruisers, having a care to previously sink any battleships that might accompany the convoy. That appears simple and practical, and it would suffice to have submarines of large enough displacement to be capable of keeping at sea for several weeks at a time. Submersibles of 1500 tons would be sufficient for certain positions. An endeavor to resist them by arming all merchantmen with rapid-firing guns would avail nothing, as after having sunk the escorting ships they would be free to do the same for the merchant vessels without having to save the merchantman's crew. In reality they would constitute ideal sea commerce destroyers, with the great advantage of being able to hide from the men-of-war. That which would afford them particular strength would be that they would operate alone, perfectly invisible and completely independent.

There is much more to be said on this subject and also on the subject of submarine mines. We will talk of them in a later issue, but in passing, it might be remarked that equally with Admirals Aube and Tournier, Sir Percy Scott has been accused of seeing too far ahead, and he was retired from office. But for him, at least, there has been one compensation, as he is about to be recalled to serve in the Admiralty. CT. VIGNOT.

NOTE.—We have seen in the preceding article that the submarine appears well equipped to attack the enemy's commerce; but will it prove as reliable in attacking a battleship squadron?—*La Vie Maritime*, 12/10.

SPEED AND GUN POWER IN NAVAL STRATEGY.—We are hearing men talk of a "new naval warfare," but the term is a loose and inaccurate one. The principles of naval strategy are eternal; it is the manner and method of using new weapons of naval attack and defence only that vary. To have a superiority of strength on the right spot at the right moment is now, as ever, the aim and object of all who are responsible for conducting sea campaigns. It is the recognition of this fact above all others, that has made Lord Fisher such a valuable naval asset to his country during the last decade. With Lord Fisher as First Sea Lord and Lord Kitchener as Commander-in-Chief of the Indian Army, the hour produced the men for the fighting services of the British Crown, so badly needed after the "regrettable incidents" in South Africa in 1899. Looking back on all that has happened since the opening of the present century, and fully remembering the brilliant services of the late Earl Roberts, not many people will be prepared to deny that the British Empire has, indeed, found the men for the hour, in the two distinguished officers we have named above. Few reformers, even of the caliber of Lord Fisher, have raised more bitter criticism and antagonism than that brilliant sailor himself, in the sweeping away of all that was obsolete in the naval practices, customs, and instruments of the past, and substituting the last work of science and up-to-date methods in their stead, while fewer still have lived to become chief directors of an instrument they were mainly responsible in fashioning, and through so searching a test as Lord Fisher is helping to guide the navy at the present moment. If antagonisms sometimes bring their subsequent compensations, Lord Fisher may well be considered to be experiencing to-day the sensations thus created, for above all things time has justified his handiwork. Always remembering the eternal laws of strategy, he may be said to have destroyed a British fleet rendered obsolescent by the evolution of science, and replaced it by a navy designed to meet modern needs. With a single stroke of the pen he contrived to sweep away all the "death-traps" (or ships of little fighting value) from the British naval stations on the seven seas. These he soon replaced with the kind of

warship needed to secure a superiority of naval power on the right spot at the right moment, by producing a British war fleet composed of vessels of the heaviest armament for their tonnage which would assure a preponderance of gun-power, combined with that superior speed which would put this gun-power to the best advantage at a critical time. Whatever else has been demonstrated in this war, it has been shown that a squadron of German cruisers composed of ships like the *Scharnhorst* and *Gneisenau* might have gone on a world cruise (in pre-dreadnought days) and smashed up every one of the numberless "death-traps" which Lord Fisher withdrew, without themselves losing a score of officers and men in all their engagements. They would have been able, by means of their speed and gun-power, to have kept the British "death-traps" out of range, and pounded them to pieces, as the *Scharnhorst* and her sister pounded the *Good Hope* and *Monmouth* off Coronel on November 1.

It was the influence of the officer who is now Lord Fisher that caused us to see that the old and eternal principles of naval strategy could best be applied in these days by a moderate number of fast, heavily-armed cruisers, battle cruisers and battleships, rather than by a legion of smaller, slower, less seaworthy vessels, or what used to be known as patrol or police ships, whose function it was to "show the flag" on the different naval stations into which the world was split up. Each of these "stations" had a group of small police vessels roaming around them, with a large cruiser or an old, or small, battleship at their head; and after the Channel and Mediterranean were passed, with their fleets of capital ships, the White Ensign was carried in the outer seas chiefly by the British "death-traps" of that time. Lord Fisher's claim to fame is that he altered all this by introducing the all-big-gun ship and the heavily-armored cruisers with which our first naval line bristles to-day—the superior ships that crack up minor craft in squadrons without losing a dozen men themselves. They furnish leaders like Admiral Sturdee with the superiority of gun-power and speed required to work out in detail the true principle of naval strategy. Knowing this as we do by the experience the present war has given us, the greater confidence is felt that when the day of the big fight in the North Sea comes, we shall be the conquerors; for in our grand fleet we have one superior in speed and gun-power to the high sea fleet of the Fatherland which Sir John Jellicoe awaits with so much patient confidence. These two fleets represent more or less the outcome of the headcraft given to their respective countries by Lord Fisher and Von Tirpitz—the two great rival naval reformers and navy designers of the last ten years. But Tirpitz generally followed while Fisher led. The Germans were always behind us in gun-power, and not till within the last few years did they mount anything heavier than a 11-inch gun on board their heaviest ships; while we adopted a 12-inch weapon and rapidly advanced to a 13.5-inch for our super-dreadnoughts. So to-day we are assured victory in the coming battle in the North Sea—quite apart from the greater number of our ships—by the greater speed and gun-power that Lord Fisher obtained for British ships, over and above that secured by Von Tirpitz in the German ships.—*United Service Gazette*, 12/24.

NAVAL LESSONS OF WAR.—Little by little, as one naval action follows another, light is being thrown on the various war problems that have been discussed in times of peace. A few big facts are beginning to stand out and the lesser fry are gradually taking their proper place in the picture. Early events, notably the loss of the three cruisers, gave undue weight to the submarine. For a time it seemed that Admiral Bacon's theories were about to be justified. Then came the unfortunate action off Chile, followed by the glorious one off the Falklands. The destruction of the *Emden* by the *Sydney*, of which an admirable account was given in the *Times* on Tuesday, is another case in point. The *Sydney's* guns overbore the small pieces of the *Emden*. In not one of these actions were submarines

engaged, and it is safe to say that had such vessels accompanied the ships of either power they could not have been used. All three actions were decided by gun-power and by gun-power alone; the torpedo had nothing to do with it. If these may be taken as small examples of what a general engagement would be like it would be almost safe to conclude that it is unnecessary for first-class ships to burden themselves with torpedoes. Their proper weapon is the gun, and the gun can do what the torpedo never can do. The evidence in favor of the gun is overwhelming. Given the fact that two ships can get within range of each other, that which is able to throw the biggest shell will win. Smaller guns, even 6-inch, seem to be of little importance, where bigger pieces come into play, and we shall have to revise all our old theories about the value of weight of metal in a broadside. Thus, Sir Philip Watt's design of the dreadnought is fully justified. A dreadnought should be able to fight an action without firing anything less than her main armament. Her big guns would destroy her opponent without any help from the secondary pieces. It is caliber that counts, and in estimating the value of fighting ships in the future we shall have to consider the primary armament only. Whether the smaller pieces will be useful for the repulsion of mosquito attacks from destroyers and similar light vessels remains to be seen. It is one of the things that war has yet to teach us. So far, in the only two actions of importance in this connection the smaller vessels have been told to clear off as quickly as possible and leave the contention to the big ships. Small vessels have not made a concerted action on a big ship and the light guns have not been tried on the particular duty for which they were intended. The time may come for them to prove their value. It must, however, be observed that if two battleships engage they can so pound each other with their huge shells that there is little probability of a 6-inch gun being left available for service even after a brief engagement. In all likelihood one or other of the vessels would be knocked out and set on fire and, if not sunk, would be at the mercy of any smaller craft that chose to give her the *coup de grâce*. The conflagration caused by shell is a matter of much moment, of which we expect to hear a great deal when the war is over. Everything points in the same direction; the big gun—that is, a gun bigger than anything your opponent has—is master of the situation. The fate of the *Good Hope* may be advanced as an argument against this view. She had 9.2-inch guns, whereas the *Scharnhorst* and *Gneisenau* had only 8.2's. As a matter of fact, the argument is all the other way. The two British ships had only two big guns between them, and thirty 6-inch weapons. On the German side there were only twelve 5.9-inch guns and no less than sixteen 8.2's. Our 6-inch batteries were useless; we know little or no harm was done to the Germans by them. Nothing but the greatest luck with her main guns could have saved the *Good Hope,* nothing at all could have saved the *Monmouth;* both were doomed from the moment the Germans decided to accept action. An extraordinarily interesting question with respect to armor is raised by both actions. In both cases the superior force received no damage worth mentioning. Some ships were not struck at all. On the other hand, the armor of the weaker force gave it no advantage. We can say no more than that it may have delayed its fate. Hence we have the problem, given superior gun-power and speed, can we dispense with much armor? In other words, can the cruiser always take the place of the battleship? We have not yet the material to answer that question.

We do not see any escape from the deduction to which the brief consideration of these two actions leads, and we do not want to escape from it, for it is comforting to know that the theories on which our navy has been reborn are being justified. Where weight of big shell per broadside is the basis of comparison we need fear no rival. What happened in small off the Falklands would happen in big in the North Sea if the German fleet should be driven out of its stronghold to fight. It could not risk a direct

action with our far more powerful guns, and would attempt to take to flight, as the *Scharnhorst* and *Gneisenau* did, with the intention that those vessels which escape might harass our trade. In a running fight we should have the same superiority as in a set action. Against our thirteen-point-fives and fifteens Germany could bring only elevens and twelves unless the German mystery ship *T* with her reputed eight fifteens is ready for sea. German tacticians have known this ever since their first surprise at finding our fleet ready for war, and they are doubly convinced of it since they have studied the results of their own and of our successful actions. The secret of sea power, numbers apart, is big guns, and lots of them, on fast ships.—*The Engineer*, 12/18.

THE VALUE OF SPEED IN NAVAL WARFARE.—There is one factor that is emerging more and more as the days pass and the sea fighting continues, and that is the great value of speed in naval warfare. Admiral Cradock could not, apparently, force his opponent to fight before the evening fell, and the latter had the advantage of light and position, because his ships were slower than the German ships. Nor could, according to the official information so far to hand, the slower British ships escape after they found themselves overmatched. The *Bristol* alone had speed enough to use to that good purpose. We do not know for certain yet, but Admiral Cradock may have had good reason for believing his chances would have been greater had he succeeded in forcing the enemy to an engagement earlier in the day. That is one of the points that fuller reports may presently clear up. In any case his lack of speed prevented this, and allowed the German commander to choose his own time for engaging the British squadron. In this action, particularly, therefore, the value of speed is specially demonstrated, and our tactics and strategy must never be allowed to suffer in future because the British warships are not the fastest in the world. We have called attention to this matter of speed several times since the war opened, for it is chiefly speed that has enabled the German commerce destroyers to achieve the amount of success they have placed to their credit.—*Army and Navy Gazette*, 11/12.

IS BATTLESHIP SUBDIVISION A FAILURE?—The loss of the *Audacious* through contact with a mine has produced a sensation in the naval world which is comparable to that which followed the sinking of the *Victoria* several decades ago, through its being rammed by the *Camperdown*. Theoretically, the *Victoria* should have taken that blow, and, although injured, should have been capable of making port for repairs. Similarly, the *Audacious*, of between two and three times her size, and with an immeasurably better subdivision, should theoretically have been able to take that blow and survive it, creeping home, in a badly damaged condition, no doubt, but still in such shape that, after a few months in drydock, she would have been capable of taking her place, once more, with the fleet.

During the Russo-Japanese War, the mines took a fearful toll of the principal fighting units, both of the Japanese and Russian fleets. Nevertheless, it is a fact that there were occasions when a ship would bump into a floating mine, and yet would crawl into port, be repaired and join the line again in fighting condition. Thus, during the operations at Port Arthur, the battleship *Sevastopol* struck a mine on her starboard side, and some four hundred square feet of the plating and framing were driven in. Nevertheless, the ship got back to Port Arthur, and repairs were made, by means of a caisson externally applied, without the ship having to go into drydock. Some months later the same ship, when returning to Port Arthur from down the coast, again struck a mine and, by a curious coincidence, she was damaged in almost exactly the same spot as before. This time, also, she managed to creep into harbor, and similar repairs wrere effected by the application of a caisson. These mines, however, must have been of much smaller size than the one which sank the *Audacious;* and the

damage, although extensive on the outer hull of the ship, was localized in its effect upon the interior bulkheading.

Judging from the rapidity with which the armored cruisers *Aboukir, Cressy,* and *Hogue* sank after being torpedoed, it is probable that the Germans are using unusually large charges in the torpedoes which are carried by their submarines. Because the submarine can get within closer range of the enemy before launching its torpedoes, the latter do not have to travel through the great distances, and at the high speed which is necessary in torpedoes launched from battleships, cruisers, or even from destroyers. Some of the weight given up to air reservoir, motive power, etc., can be assigned to the explosive charge, which is made very much larger. It is possible that the German submarine torpedoes are carrying as high a charge as three hundred pounds of the most powerful explosive.

There is no hard and fast restriction governing the weight of charge that can be placed in a mine; and, judging from the results achieved in the case of the *Audacious,* it is likely that the mine which sank her carried at least five hundred pounds of explosive. If we bear in mind that the destructive effect of the detonation of a mass of explosive varies as the cube of the charge, it can be realized how great was the disrupting power of the enormous volumes of gas which were let loose within the interior of the ship at the moment of detonation. The water on the outside of the ship being incompressible, the force of the explosion would seek the path of the least resistance, which naturally would lie through the comparatively frail structure of the ship; and it must be understood that the destructive energy would not be limited merely to bursting in the side plating and framing, but would be continued in the form of an enormous volume of gas under high pressure, suddenly putting under heavy stress the closed compartment or compartments immediately affected. It can be readily understood that the pressure thus engendered might be sufficient to start the seams for a considerable distance along the side of the ship, and to loosen up, not only the seams of the adjacent bulkheads, but also the edges of the bulkheads where they are attached to the inner bottom, the sides and the decks of the ship.

Experience in the testing of bulkheads on warships has shown that while they will remain tight under a head of 35 feet, or say 15 pounds, to the square inch, leakage will develop when the depth or head reaches 40 feet. Ordinarily bulkheads are designed to withstand a head or immersion of 35 to 37 feet. Now it can readily be supposed that the pressure of the gases thus expanded within the ship may have greatly exceeded the safe limit of 15 pounds; and, if so, although the bulkheading may not have been broken away, serious leakage may have been started throughout a considerable area of the interior of the ship. This leakage would be slow but sure; and it was probably this gradual inflow, impossible to prevent, that brought about the gradual loss of buoyancy of the *Audacious,* which appears to have remained afloat for about thirteen hours after the blow was delivered.

Undoubtedly the disaster will cause naval constructors the world over to revise or greatly improve their present systems, already most elaborate, of subdivision. Lately the French have suggested that provision be made for limiting or checking altogether the inrush of gases by providing an interior longitudinal wall of armor, inwardly curved so as to present a concave face to the explosion. This would mitigate those leakage effects which take place when a plane vertical bulkhead wall is exposed to excessive pressure.

Let it not be imagined for a moment that this disaster in any sense seals the fate of the battleship. This still remains, and for many years to come must remain, the principal arm of a navy for winning decisive results. It must be borne in mind that, had it not been for the heavy sea that was running and the fact that the engines of the *Audacious* were disabled, she could have been brought back to her naval base, either under her

own power or by towing. As it was, she was unable to move, and the heaviest towing cables made fast to the *Olympic* snapped like threads in the heavy scend of the sea.—*Scientific American*, 12/12.

REVIEW OF THE YEAR 1914—NAVY.—Any review of naval and military affairs must necessarily take account of the lessons which have been taught by the great World War. Limitations of space prevent any review here of the events of the war; that must be left to be dealt with in detail in a later issue. It is sufficient in the present review to draw attention to the fact that from the opening days of the conflict to the present hour the theories on which modern armies and navies, with their elaborate and complicated *matèriel*, have been built up, have been vindicated to a degree and with an exactness which is really wonderful. As regards war on the sea, it has been demonstrated that battleships are the backbone of any navy, that upon these all the other units depend, and to the battleship's efficiency they all minister. Proof of this is seen in the fact that it is the preponderance of the British battleship line which for nearly half a year has been holding the main German fleet inactive within the shelter of its own harbors. In all the engagements which have taken place between the minor units—cruisers, destroyers, etc.—victory has always lain with the fleet which possessed the heavier artillery and the speed to enable that artillery to be used at most advantageous range. That much-debated type, the battle cruiser, so far as it has had opportunity, has abundantly vindicated itself, a notable case in point being the destruction of Admiral von Spee's squadron in the South Atlantic. The scout cruiser of high speed has proved its value on all the seven seas; as witness the wonderfully successful commerce-destroying work of the German scout cruisers *Emden*, *Karlsruhe*, and their sisters, and the exploits of the British *Undaunted* and *Arethusa*, designed as destroyers of destroyers, which, in the case of the *Undaunted*, sank in one morning four German destroyers in a running fight. No less effective, as a type, has been the large, well-armed and swift destroyer. To these vessels has fallen, very largely, the difficult and dangerous work of maintaining a close blockade of the German ports. On only two occasions have the Germans broken through for a raid along the coast of England. The destroyer flotillas have been the object of ceaseless attack by submarines, several of which they have sunk by ramming. It is noteworthy that by keeping a sharp lookout and by dexterous use of high speed and the helm the destroyers have usually been able to detect and avoid the torpedoes of the enemy. The early losses of the British by submarine attack proved that it was impossible for the larger cruisers to maintain a close patrol of the enemy's shores. It is probable that ships of the size of the *Cressy* have been withdrawn farther off shore, and that to the swift destroyers has been allotted the work of forming the inner lines of blockade. The submarine has done exactly what the naval experts believed it would do, by forcing the larger and more valuable ships of the enemy to remain far from the home coast line. Nowhere has the German officer proved his efficiency so thoroughly as in the submarine service. Such good work has he done with the coast-defence submarines of moderate size that the advent, at an early date, of the seagoing submarine of large size and battleship speed is a certainty.—*Scientific American*, 1/2.

NAVAL PUBLICATIONS

BOOK REVIEWS

"Attack and Defense of Fortified Harbors." By Captain Arthur P. S. Hyde, Coast Artillery Corps, U. S. Army.

This was originally published as a series of articles in the *Seattle Daily Times*. The author was on duty as instructor of the Coast Artillery Reserve Corps of the National Guard of Washington. He has revised and republished the papers in a short but interesting treatise, in pamphlet form, for the instruction of the officers of that corps.

He has, very naturally, taken the defenses at the entrance to Puget Sound and the surrounding country, as the locality for illustrating his principles, and has used the attack on Santiago in '98 and Farragut's attack on the forts of Mobile Bay, as historical examples of different methods of attack.

The paper is of especial interest and value in that it shows the fallacy of a purely naval attack on fortified harbors and emphasizes the necessity for co-operation between land and naval forces in a joint attack to ensure victory and lasting results. J. W. W.

"Imperial America." By J. M. Kennedy. (New York: James Pott and Company. 363 pages. $3 net.)

Written by an Englishman who sees in the recent controversy over Panama Canal tolls an indication of the fierce struggle between his country and the United States that is sure to follow for the trade of western South America, the volume is admittedly hostile in purpose. He does not like the Monroe Doctrine, and he resents in its entirety our attitude towards Central and South America. Further, he sees in the whole course of American history a craving for land and power, a tendency which Englishmen should now recognize as nothing less than imperialistic.

The serious critic is, for the man not too sensitive, oftentimes more entertaining than the effusive admirer, and the author's account of American economic history, which occupies four-fifths of the volume, is decidedly readable. Many events are put in a new light, being related by one who has been bred amid different institutions, and have a freshness and interest not always found in our own histories. The author's narrative, however, is marred by so many inaccuracies that the whole work is thrown under suspicion. Here are a few of them:

The statement is made on page 61, and twice referred to on page 66, that in consequence of Washington's operations about Boston "Howe and all his garrison surrendered to Washington's army"; whereas Howe did not surrender but evacuated Boston, from whence he sailed with his army

and 900 refugee loyalists for Nova Scotia. Peace which ended the war with Tripoli was made, not in "1804" (p. 138), but in June, 1805. There was no work in 1813 known as "Lines' Register" (p. 158); but there was the celebrated "Niles's Register." It was not Captain John "Faremont" (p. 193), but Frémont, who in 1846 was active in California. And any school-boy would show merriment and wish to correct the reference to the American statesmen "Daniel Clay and Webster" (p. 195).

Less ludicrous, but not less inaccurate, we think, is the author's characterization of Jefferson: "a capable intriguer and a clever politician, but, on the whole, a superficial demagogue and not a statesman who could take strong measures when strong measures were justified." We take issue with the statement that the real causes of the war of 1812 consisted "in the ambitions of rising political leaders like Henry Clay, who is known to posterity chiefly by the inexpensive cigar named after him." Again, we cannot accept his account—a strange perversion of the facts—that President Madison, in 1814, dismayed by the progress of events in our not over-successful war "approached the Emperor Alexander of Russia and besought him to intercede with England." And, further, we can find no authority whatever for his ghastly story that at the termination of the battle of the Thames, where Tecumseh was killed, "His skin was cut up by the infuriated American soldiers into razor strops, which were presented to the more important members of Congress."

These are but a few of Mr. Kennedy's aberrations. Such lack of scholarship and such blindness of prejudice make us give little heed to his belief that America's old faculty of assimilation has gone, and she cannot look for any real unity; and having no national unity can possess "no definite artistic character at all." Then follows the condemnation of our literature and art: "We shall find in the United States, if we think it worth while to take the trouble to do so—I am far from encouraging the reader to enter upon the task—a relatively large number of writers, painters, and sculptors of the third or fourth class; but very, very few artists who can be called distinctively American."

Would that we could dismiss so easily, as excellent humor, the charge, often repeated, that Americans are materialistic, moved by nothing so much as by money. Would, too, that the acquisition of the Panama Canal Zone and our treatment of the Central and South American republics were at all times above suspicion.

If in these relations there have been words spoken and deeds committed to be regretted, however, they are far from proving that, as Mr. Kennedy affirms, there are in America no general standards of conduct and behavior, and nothing of innate discipline and self-control such as he finds in the aristocratic families of Europe.

A writer infinitely greater than Mr. Kennedy, Charles Dickens, visited the United States in 1842; and struck by the false glamor that the New World had for his countrymen, and seeing much to criticise and condemn, he wrote his "Martin Chuzzlewit"—a book that Mr. Kennedy refers to with great gusto. Mr. Kennedy fails to add, however, what he surely cannot be ignorant of, that a quarter of a century later Dickens made a

second visit and at its close publicly declared, not only his astonishment at the amazing changes, moral and physical, which he had seen, but also his realization that his earlier observations had not been altogether correct. As he expressed it: "Nor am I, believe me, so arrogant as to suppose that in five and twenty years there have been no changes in me, and that I had nothing to learn and no extreme impressions to correct when I was here first."

Some years hence, if Mr. Kennedy has the honesty and fair-mindedness of Dickens, he may volunteer a similar confession. Already history has most emphatically refuted what was, at the time of writing, perhaps his most striking affirmation: "When once the value of the Panama Canal is realized and when the designs of the Americans, with the canal as a basis, are realized also, ... we are just as likely to have a war with the United States as with Germany." This, from his Preface, dated June, 1914, was written but one month before the conflict with Germany. It is hazardous to prophesy. C. S. A.

"The Bluejacket's Manual." Revised by Lieutenant Norman Van der Veer, U. S. Navy.

In this revision the scope of the Bluejacket's Manual has been considerably increased and the arrangement altered to conform to the provisions of general order No. 63. The book is divided into five parts, as follows:

Part I. The Subjects which Every Man on Board Ship Should Know.

Part II. The Subjects which Ordinary Seamen Should Know.

Part III. The Subjects which the Higher Ratings of the Seaman Branch Should Know.

Part IV. The Subjects which Chief Petty Officers Should Know.

Part V. The Subjects which Men of Special Ratings Should Know.

In addition to the complete book, Parts I, II, and V have been published in individual bindings, and Parts III, and IV combined in another binding, thus breaking the complete manual into four separate books, and obviating the necessity of buying the entire volume when only certain parts are desired.

An idea of the contents may be briefly indicated as follows:

Part I. A commonsense talk on discipline and duty, contributed by Captain Ridley McLean, comprising 21 pages of general information and advice for the enlisted man. General order 110 is reproduced *verbatim*. A chapter is then devoted to details concerning the various professional and technical schools of the service, including qualifications for admission. The regulations in regard to enlistments, discharges, court martials, etc., are made clear. There is a pay table showing the actual base pay for every rating, and the various allowances are explained in detail. General ship drills are fully explained. A chapter is devoted to the latest uniform regulations. Salutes and etiquette are explained at some length. A brief chapter on athletics in the fleet and a contribution on first aid by Medical Director C. F. Stokes, conclude this part of the book.

Part II. The greater portion of Part II is compiled from the various drill books. There is a chapter explaining in detail the duties of all lookouts. The school of the recruit is set forth and various positions of the manual at arms are illustrated. The new infantry equipment is discussed in full with numerous plates. The service rifle and Colt automatic pistol are explained with plates. There is also a chapter on signals.

Part III. The subject of boats is taken up in detail and much of the text of the boat book incorporated. There are chapters on marlinespike seamanship, deck seamanship, ground tackle and the duties of seamen as instructors. The various courses in small arms marksmanship are explained. The regulations respecting safety precautions in regard to both small arms and great guns are quoted and carefully explained. The subjects in which gun captains are examined are given, together with hints as to the best sources of information on each subject. There is a short talk to petty officers giving general information and advice. Then chapters follow that take up the individual duties of the various petty officers of the seaman branch; masters-at-arms, coxswains, boatswains' mates, gunners' mates, turret captains and quartermasters.

Part IV. This part begins with a short talk to chief petty officers on their general duties and responsibilities and continues to give a general guide or index as to what chief petty officers are supposed to know. Certain subjects, however, which concern all chief petty officers, such as duties with the beach guard, guard mail, patrol, etc., are set forth in detail.

Part V. This part, also, is more of a guide than a text book. Chief Carpenter Richards has, however, contributed a list of questions and answers for the examination of deck artificers. It is noted that the Bureau of Supplies and Accounts publishes manuals for the instruction of yeomen attached to the Pay Division and for commissary stewards, ships' cooks, and bakers. Attention is also called to similar manuals issued by the Bureau of Medicine and Surgery for hospital stewards and hospital apprentices. The interests of the musicians are not overlooked and the book concludes with a lot of good advice that might help a mess attendant if he would read it.

The increase in subject-matter is roughly indicated by comparing the number of pages in the two editions. The revised manual comprises 849 pages and the previous edition 407 pages. Those who were familiar with the previous edition will perhaps grumble a bit over the make-up of the new edition, which is not as well printed and is less handy for pocket stowage and use on shipboard.

Some will venture to suggest that parts of this book might be condensed without much loss. The average sailorman, if abruptly handed the complete volume, would probably be somewhat taken aback. Lieutenant Van der Veer, however, has largely overcome this objection by the logical arrangement and division into five parts. He has, moreover, made more accessible much useful information and presented it in more attractive fashion than is customary in books of this sort. It is a safe conjecture that both officers and men will welcome this edition as filling a keenly felt want.

C. C. G.

"Flying: Some Practical Experiences." By Gustav Hamel and Chas. C. Turner. (London: Longmans and Company.)

The firm that contributed Duchene's "Mechanics of the Aeroplane" has added a valuable contribution to the progress of aeronautics by publishing this book, which supplements the other in a way to permit the general reader, as well as the aeronautic specialist, to view the practical side of aviation through the spectacles of the two very competent authors, assisted by such able air-masters as Henry Farman, Howard Wright, Pierre Marechal, Holt Thomas and Lieutenant Conneau. The aeronautical comments of the well-known "Pegasus" of the *London Times* and the editors of several English aeronautical serials are also liberally quoted and add to the general interest of the book.

The principal value of this volume of 338 pages lies in the chapters on Aptitude for Flying, The Aviator's First Lessons, Accidents and Their Prevention, Cross-Country Flying, Choosing a Machine, Some Practical Points, Aerial Touring and the Cost of Flying, Different Kinds of Flying, High Flying, Flying on Different Types, Oversea Flying, Summer and Winter Flying, and Aerial Photography.

There are two excellent chapters on Weather, Winds, Eddies, and Other Disturbances, which are confined to practical, up-to-date information with reference to air conditions, over the British Isles in particular. There are three excellent chapters of forecast on The Future of Flying, The Uses of Flying, and The Aeroplane in Warfare, with notes on the seaplane by a high naval officer. The conjectures on warfare have been reasonably verified, though considerably modified, by test in the present war.

The chapter on Oversea Flying is somewhat pessimistic, as is natural, from the viewpoint of land-flyers. It is assumed that a sea-flyer is required "to undergo a sea voyage in moderately rough weather with frequent ascents and descents," although it is not claimed that the land-flyer should contemplate landing and rising from any sort of terrain but that which is suitable. The authors do not seem to realize that the landing places of sea-flyers will be more suitable, normally, than those open to land-flyers.

But the article on seaplanes is better. In the main it agrees with out ideas, but it seems remarkable that this "high naval officer" should not have laid some stress upon the advantage of aircraft to a fleet engaged in maintaining a *close* blockade. He seems to have gained the impression that the seaplane may extend the eyes of the submarine more advantageously than it may enlarge the vision of the latter's quarry. On this side of the Atlantic, I think, it is recognized that aircraft may be made to offer greater protection to the larger units of a fleet, for the reason that submarines cannot carry them, while the large ships can, and that, in attacking submarines, aircraft can fly low enough to make sure of a hit.

There is no padding of this book with the usual historical pabulum and descriptions of visionary schemes, but there is some pardonable overlapping in chapters, which serves to accentuate certain impressions which are regarded as of great importance by the authors. The conservative spirit of the good advice which punctuates the book may be inferred from the following quotation: "It cannot be too often laid down that the best pilot

is not he who exhibits great audacity, but rather the man who makes sure of his goal by preventing the possibility of a mishap." Especially interesting and instructive is the brief history and the clear exposition of the simplicity, the fine points, and the benefits to be derived from certain phases of "trick flying." Particularly commendable is the plea and the reason given for more intelligent direction in establishing the technical features of competition in aero contests to the end that progress may be advanced in the right direction rather than diverted into paths that retard the development of aerial navigation.

The notes on "things that never should be done" are notable, as are also the answers given to hypothetical questions, propounded by one of the aeronautical serials, in regard to details of adjustment and of management, in which the pilot is led to see the advantage of cultivating the habit of thinking efficiently, backed by a thorough theoretical knowledge of the scientific principles of aerial architecture. There is no attempt to dip into the scientific investigations that have had so much influence over recent progress in aeronautics, but it is assumed that proficiency in the art of flying will be materially advanced by a thorough understanding of the scientific data to be obtained from other books.

A few unimportant mistakes appear in regard to the details of American flights. For example, a page is devoted to statistics of Cal. Rodgers' flight across the American Continent, which is described as a journey of 2600 miles only, from New York to Kansas City. It is also stated erroneously that this able pioneer aviator lost his life at Long Beach, Cal., instead of at Atlantic City, N. J.

A brief chapter by Marconi, treating of Wireless on Aeroplanes, shows the advantages of wireless as well as the means for overcoming the difficulties to be encountered with it in aeroplanes. It shows what not to expect, but it would have been more satisfactory if some details of the accomplishments of other systems had been given.

One of the best chapters is the last, by Mr. J. Elrick Adler, F. R. C. S., on the Medical Aspect of Aviation. This should be read by every aviator, especially by all prospective aviators and by all who would speculate upon the age, the mental and physical characteristics and the choice of aviators. It deals scientifically, but tersely and understandingly with the subject of medical examination, effect of altitude upon blood-pressure, vision, brain, hearing, etc.

On the whole, the book is one that may be read profitably by any aviator, and is needed by every student aviator as well as by anyone interested in gaining a reliable comprehension of the practical technique of flying.

W. I. C.

NAVAL ACADEMY GRADUATES' ASSOCIATION

Although four months intervene before the annual alumni meeting and dinner on Thursday, June 3, it is none too early for those classes who intend to have their reunions at that time to start their plans.

This year will be the five-yearly anniversaries of the classes '10, '05, '00, '95, '90, '85, '80, '75, '70, '65, etc., and the secretary of the association would like to get into communication with the members of those classes who may have charge of any proposed class reunions. This "getting together" of the classes, at least once in five years, is a very good precedent to establish, and each year finds a larger number of classes interested.

The effect is to renew old class ties, and to strengthen the bonds which should always bind each class as well as each individual to their alma mater. Then, too, the effect on the undergraduates cannot but be good. It shows them that class-spirit is not a myth, and that elapsing years have no effect to weaken or destroy it.

At the business meeting there will be considerable of interest to graduates, and as large an attendance as possible is desired. At that time the Farragut Memorial Window Committee will have something definite to report, and there is a change proposed to the Constitution which will come up for its second vote and possible final adoption.

In connection with the Farragut window, there has been another meeting of the committee in Washington. At that time full-sized colored drawings were submitted, and with the exception of a number of minor changes, were completely satisfactory. It is the opinion of the committee that the graduate body will be proud to know that, through their efforts, such a beautiful work of art will be installed in the chapel, as will prove an inspiration to many an undergraduate in the years to come.

The fact, however, must not be lost sight of that the funds for the window must be raised and will call for a special effort from all. Commander Jewell reports that subscriptions are coming in rather slowly, which may be due to a lack of knowledge of the

project. It is possible that our methods of publicity are at fault. To rectify any such lack of knowledge on the part of those in the service, it is thought best to reprint here the circular which was sent out in October:

FARRAGUT MEMORIAL WINDOW COMMITTEE
OF THE
U. S. NAVAL ACADEMY GRADUATES' ASSOCIATION

WASHINGTON, D. C., September 15, 1914.

To the graduates of the Naval Academy:

In the spring of 1913, the Naval Academy Graduates' Association, by a large majority vote, decided to erect, in the chapel of the Naval Academy, a stained glass window to the memory of Admiral David Glasgow Farragut, who is generally recognized as the greatest naval leader of his time, and who is not now commemorated in any way at the Naval Academy. Permission was given to place the glass in the large western window in the new chapel; and a committee was appointed to select a design, secure subscriptions, and carry the project to a conclusion.

By vote of the association, the subscription list is open only to graduates of the Naval Academy. This is the first gift which the alumni of the Academy, as a body, have ever made to their alma mater.

The committee, appointed by the council of the association, consists of the following graduates:

Rear Admiral J. C. Watson, U. S. Navy, *Chairman.*
The Superintendent of the Naval Academy, *ex-officio.*
Captain A. W. Grant, U. S. Navy.
Honorable John W. Weeks, U. S. Senate.
Captain S. S. Robison, U. S. Navy.
Commander C. T. Jewell, U. S. Navy, secretary-treasurer of the committee.
Professor of Mathematics D. M. Garrison, U. S. Navy, secretary-treasurer of the Graduates' Association.

After several months spent in consultation and in the consideration of various designs, with the assistance and advice of the National Commission of Fine Arts, the committee has signed a contract with the Gorham Company of New York, for the erection of a window according to the design of Mr. Frederick Wilson, the artist who designed the windows now in place in the Academy chapel. Materially assisted by Admiral Watson, who was Farragut's flag-lieutenant and personal friend, the committee has secured a window which fittingly commemorates the great admiral, and which will appeal to all sea-faring men; while at the same time is commended by our artistic adviser as being of great beauty and originality.

The cost of erecting and financing the window will be about $10,000. To meet this expense, a contribution of five dollars is asked from each living graduate, though larger or smaller amounts will be gratefully received. Any surplus remaining after all expenses are paid will be turned into the treasury of the Graduates' Association.

Commandants of naval stations, commanders-in-chief of fleets, commanding officers of ships acting singly, chiefs of bureaus of the Navy Department, and officers of auxiliary associations of graduates, have been asked to act as agents for the committee in circulating this information, and in receiving subscriptions. Individual receipts will be forwarded to subscribers when their names are received from these agents.

Subscriptions will also be received by the undersigned, to whom all inquiries should be addressed.

Please make checks payable to "Farragut Window Committee."

By direction of the committee,

C. T. JEWELL,
Commander, U. S. Navy, Retired,
Secretary-Treasurer.

Following are lists of retirements, deaths, resignations, etc., that have occurred during the calender year 1914:

RETIREMENTS

1029	Class '70	Vreeland, Charles E.	Mar. 10, '14	Rear Admiral.
1111	" '72	Southerland, Wm. H. H.	July 10, '14	Rear Admiral.
1129	" '72	Cottman, Vincendon L.	Apr. 13, '14	Rear Admiral.
1145	" '73	Nicholson, R. F.	Dec. 15, '14	Rear Admiral.
1246	" '75	Little, William N.	Dec. 31, '14	Rear Admiral.
1268	" '76	Rogers, Charles C.	Apr. 27, '14	Rear Admiral.
1286	" '76	Gove, Charles A.	Dec. 11, '14	Rear Admiral.
1422	" '79	Kellogg, Frank W.	June 30, '14	Captain.
1423	" '79	Gibbons, John H.	June 30, '14	Captain.
1484	" '80	Van Duzer, Louis S.	Apr. 8, '14	Captain.
1690	" '82	Leonard, John C.	June 30, '14	Captain.
1756	" '84	Hill, Frank K.	June 30, '14	Captain.
1810	" '85	Bispham, Harrison A.	June 30, '14	Captain.
1822	" '85	Evans, George R.	June 30, '14	Captain.
1909	" '88	Hayward, George N.	June 30, '14	Commander.
1946	" '89	Patton, John B.	June 30, '14	Commander.
2105	" '93	Parker, Thomas D.	Nov. 12, '14	Commander.
2124	" '93	Ryan, John P. J.	Mar. 4, '14	Lt. Comdr.
2130	" '93	Pollock, Emmett R.	June 30, '14	Commander.
2137	" '94	Gillis, Irvin Van G.	June 30, '14	Commander.
2141	" '94	Stone, Raymond.	June 30, '14	Commander.
2146	" '94	Babin, Provoost.	June 30, '14	Commander.
2149	" '94	Fullinwider, Simon P.	June 30, '14	Commander.
2175	" '94	Whitted, William S.	June 30, '14	Commander.
2181	" '94	DeLany, Edwin H.	June 30, '14	Commander.
2286	" '97	Falconer, William M.	June 30, '14	Lt. Comdr.
2327	" '98	Macy, Ulysses S.	June 30, '14	Lt. Comdr.
2404	" '00	Kear, Carleton R.	June 30, '14	Lt. Comdr.
2447	" '00	Schoenfeld, John W.	June 30, '14	Lt. Comdr.
2507	" '01	Fowler, Orie W.	May 16, '14	Lt. Comdr.

2535	Class	'02	Osburn, Franklin W.	June 30, '14	Lieutenant.
2566	"	'02	Campbell, James A.	June 30, '14	Lieutenant.
2585	"	'02	Moses, William J.	June 30, '14	Lieutenant.
3224	"	'08	Clark, Carl C.	Sept. 2, '14	Lieut. (J. G.)
3311	"	'08	Meredith, John E.	Dec. 23, '14	Ensign.
3338	"	'08	McCormick, Eugene D.	Nov. 18, '14	Ensign.
3789	"	'11	Lamberton, Lambert.	Mar. 3, '14	Ensign.

DEATHS

195	Date	'46	Parker, James.	Mar. 23, '14	Perth Amboy, N. J.
280	Class	'56	Ramsey, Francis M.	July 19, '14	Washington, D.C.
354	"	'58	Howison, Henry L.	Dec. 31, '14	Yonkers, N. Y.
367	"	'59	Mahan, Alfred T.	Dec. 1, '14	Washington, D.C.
396	"	'60	Robeson, Henry B.	July 16, '14	Walpole, N. H.
491	"	'61	Miller, Merrill.	Aug. 5, '14	Berkeley, Cal.
567	"	'63.	Pendleton, Charles H.	July 18, '14	Martinsburg, W. Va.
608	"	'65	Bradford, Royal B.	Aug. 14, '14	Boston, Mass.
649	"	'65	Buford, Marcus B.	Dec. 7, '14	Paris, France.
671	"	'66	Watts, William.	Jan. 1, '14	Morristown, N. J.
788	"	'67	Dunlap, Andrew.	Apr. 11, '14	Washington, D.C.
792	"	'67	Field, Wells L.	Nov. 27, '14	Washington, D.C.
877	"	'68	Stevens, Thomas H.	Oct. 3, '14	Washington, D.C.
915	"	'68	Moore, William S.	July 12, '14	Duxbury, Mass.
926	"	'69	Brown, Charles R.	Feb. 1, '14	Newton Centre, Mass.
943	"	'69	Winslow, Herbert.	Sept. 24, '14	Florence, Italy.
993	"	'70	Dyer, George L.	Apr. 2, '14	Winter Park, Fla.
1013	"	'70	Reamey, Lazarus L.	May 25, '14	Washington, D.C.
1274	"	'76	Henderson, Richard.	Feb. 24, '14	Salisbury, N. C.
1431	"	'79	Read, Maurice L.	Mar. 21, '14	Asheville, N. C.
1563	"	'81	Moses, Franklin J.	Sept. 26, '14	Vera Cruz, Mex.
1723	"	'83	Frazier, Robert T.	Apr. 19, '14	Baltimore, Md.
1779	"	'84	Hayes, Charles H.	Jan. 16, '14	Garrison, N. Y.
1840	"	'86	Caldwell, William H.	Jan. 3, '14	Brooklyn, N. Y.
1842	"	'86	Strite, Samuel M.	Dec. 15, '14	Hagerstown, Md.
1898	"	'87	Moseley, William B.	June 26, '14	Brooklyn, N. Y.
1912	"	'88	Hubbard, John F.	Jan. 10, '14	Hong Kong, China.
1980	"	'90	Signor, Matt H.	Nov. 24, '14	New York, N. Y.
2257	"	'96	Curtin, Roland I.	Feb. 20, '14	Annapolis, Md.
2584	"	'02	Corning, Merritt S.	July 8, '14	New York, N. Y.
3082	"	'07	Murray, James McC.	Feb. 16, '14	Pensacola, Fla.
3789	"	'11	Lamberton, Lambert.	Sept. 2, '14	Hopacong, N. J.
3821	"	'11	Curry, Charles H.	June 13, '14	Philadelphia, Pa.

RESIGNATIONS

2498	Class	'01	Spafford, Edward E.	Dec. 10, '14	Lt. Comdr.
			14 E. 63d St., New York, N. Y.		
2551	"	'02	Smith, William W.	Feb. 21, '14	Lieutenant.
			Westinghouse Machine Co., East Pittsburgh, Pa.		
2823	"	'06	Lowman, Roy L.	Oct. 28, '14	Lieutenant.
			124 Main Street, Johnstown, Pa.		
2897	"	'06	Lake, George E.	Dec. 31, '14	Lieutenant.
			1708 Ridge Ave., Evanston, Ill.		
3141	"	'08	Struble, George W.	Oct. 2, '14	Lieut. (J. G.)
			Bethlehem Steel Co., South Bethlehem, Pa.		
3301	"	'08	Dague, William H.	Nov. 12, '14	Lieutenant.
3465	"	'09	Davis, Roy H.	Jan. 23, '14	Ensign.
3688	"	'11.	Day, Samuel K.	Sept. 28, '14	Ensign.
			68 W. Paint St., Chillicothe, Ohio.		
3723	"	'11	Sylvester, John McF.	Dec. 8, '14	Ensign.
3777	"	'11	Fenner, Milton M.	Oct. 16, '14	Ensign.
			178 Central Ave., Fredonia, N. Y.		
4151	"	'14	Winslow, John S.	Nov. 2, '14	Midshipman.
			642 Oak St., Cincinnati, Ohio.		
4181	"	'14	Mittendorf, Harvey C.	Sept. 3, '14	Midshipman.
			3100 Losantiville Ave., Pleasant Ridge, Cincinnati, Ohio.		
4204	"	'14	Palmer, Edward C.	June 5, '14	Midshipman.
			22 Yale Station, New Haven, Conn.		
4231	"	'14	Dortch, William B.	Sept. 3, '14	Midshipman.
			644 Forest Ave., Gadsden, Ala.		
4234	"	'14	Bower, Thomas T.	June 5, '14	Midshipman.
			Mooresburg, Pa.		
4280	"	'14	Walker, Augustus W.	Aug. 17, '14	Midshipman.
			Lawrenceburg, Pa.		
4285	"	'14	Leonard, Henry R., Jr.	June 5, '14	Midshipman.
			Bethlehem Steel Co., S. Bethlehem, Pa.		

WHOLLY RETIRED

3729	Class	'11	Gordon, Charles C.	Jan. 15, '14	Ensign.

DISCHARGED

3225	Class	'08	Smith, Frank R., Jr.	Oct. 9, '14	Ensign.
3486	"	'09	Marion, Paul H.	Dec. 16, '14	Ensign.

DISMISSED

1919	Class	'88	West, Ernest E.	Apr. 30, '14	Capt. U. S. M. C.
2584	"	'02	Corning, Merritt S.	Apr. 2, '14	Lieutenant.
3595	"	'10	Robinson, Earl W.	Dec. 3, '14	Ensign.
3665	"	'11	Hawley, Darrell B.	June 10, '14	Ensign.

ANNUAL FINANCIAL REPORT OF THE SECRETARY AND TREASURER OF THE U. S. NAVAL INSTITUTE

TO THE OFFICERS AND MEMBERS OF THE INSTITUTE:

Gentlemen.—I have the honor to submit the following financial report for the year ending December 31, 1914:

ITEMIZED CASH ACCOUNT

RECEIPTS FOR THE YEAR 1914

Items	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total
Dues	$476 38	$1,671 39	$448 10	$439 45	$3,035 32
Subscriptions	593 99	194 22	273 88	401 29	1,463 38
Extra publications	9,885 55	4,956 23	5,126 19	3,194 88	23,162 85
PROCEEDINGS	117 49	119 16	40 70	26 78	304 13
Advertisements	274 02	38 20	369 90	55 50	737 62
Interest on money invested	692 50	383 14	1,051 50	599 05	2,726 19
Binding	5 10	28 40	8 15	2 10	43 75
Postage	103 10	98 42	68 05	71 34	340 91
Credits	4 95	3 98	5 92	21 95	36 80
Books purchased	34 91	15 80	69 50	58 75	178 96
Sundries	57 52	340 28	3 34	698 59	1,098 73
Total	$12,245 51	$7,849 22	$7,465 23	$5,569 68	$33,129 64

EXPENDITURES DURING THE YEAR 1914

Items	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total
Printing and binding PROCEEDINGS	$1,511 11	$2,091 90	$1,402 63	$2,493 64	$7,499 28
Printing and binding extra publications	5,775 25	2,636 35	1,521 99	3,507 14	13,440 73
Salaries	1,005 00	1,005 00	1,005 00	1,005 00	4,100 00
Contributors	232 00	522 00	545 00	1,003 00	2,222 00
Authors of books	1,083 20	1,412 80	663 60	319 00	3,478 60
Postage and telegrams	200 88	212 50	199 68	180 10	793 16
Expressage	20 49	20 17	18 72	12 17	71 55
Board meetings	99 80	94 60	....	63 00	257 40
Office expenses	51 98	42 55	1 60	40 35	136 48
Stationery	145 03	48 87	122 98	95 96	412 84
Prize essay award	222 35	....	....	....	222 35
Honorable mention award	360 00	....	....	....	360 00
Purchase of books for sale	24 78	34 60	57 45	85 90	202 73
Advertisements	23 05	22 40	28 05	33 70	107 20
Sundries	14 85	11 25	9 17	127 13	162 40
Secretary of Navy, check deposited with proposal	....	....	....	600 00	600 00
Total	$10,769 77	$8,154 99	$5,575 87	$9,566 09	$34,066 72

SUMMARY

Balance unexpended January 1, 1914	$14,579.35
Total receipts for the year 1914	33,129.64
	$47,708.99
Total disbursements for the year 1914	34,066.72
Balance on hand January 1, 1915	*$13,642.27
Bills receivable for back dues	957.92
" " " subscriptions	13.50
" " " advertisements	527.37
" " " extra publications	4,695.89
Interest " " deposits F. N. B.	70.68
Value of back numbers of the PROCEEDINGS	200.00
" " Institute property (office)	285.00
" " extra publications	5,000.00
	$25,392.65

LIABILITIES

Lord Baltimore Press	$1,051.21	
Royalties due authors of books	1,705.90	
Wells Fargo Express Co	12.89	
Western Union Telegraph Co	1.46	
C. and P. Telephone Co	1.30	
Rapid Addressing Machine Co	12.00	
Our Navy Publishing Co	8.70	
Geo. W. Jones	1.45	
Lucas Brothers	11.76	
		2,806.67
		$22,585.98

* The balance ($13,642.27) unexpended January 1, 1915, is distributed as follows:

Seamen's Bank for Savings	$3,000.00
Rhode Island Hospital Trust Co	3,298.90
Society for Savings, Hartford, Ct	3,347.14
In Farmer's National Bank	3,996.23
	$13,642.27

SECURITIES (BONDS) DECEMBER 31, 1914

Southern Railway 5 per cent Registered Gold	$6,000.00
Washington Railway and Electric Co., 4 per cent	2,000.00
Northern Pacific and Great Northern Co., 4 per cent	18,000.00
Potomac Electric Power Co., 5 per cent	2,000.00
Northern Pacific 3 per cent	12,000.00
Baltimore and Ohio ($7,113.14 * of these bonds are the † Reserve Fund)	9,000.00
New York City, Registered, 4¼ per cent	7,000.00
	$56,000.00

† RESERVE FUND.—This, by the Constitution, is composed of the $3,050 originally credited to it, together with all life fees which have been or may hereafter be received, and the principal of this fund shall be held in perpetuity to guarantee the future interest of the life members. $7,113.14*

Audited and found correct.

H. B. PRICE, Commander, U. S. Navy,
T. L. JOHNSON, Lieut. Commander, U. S. Navy,
JOHN S. BARLEON, Lieut. (J. G.), U. S. Navy.
Auditing Committee.

JANUARY 15, 1915.

NOTICE

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It now enters upon its forty-second year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

ARTICLE VII

Sec. 1. The Institute shall consist of regular, life, honorary, and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fees to the Secretary and Treasurer. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from Officers of the Army, Revenue Cutter Service, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: "Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing."

Sec. 8. The annual dues for regular and associate members shall be two dollars, all of which shall be for a year's subscription to the UNITED STATES NAVAL INSTITUTE PROCEEDINGS, payable upon joining the Institute, and upon the first day of each succeeding January. The fee for life membership shall be thirty dollars, but if any regular or associate member has paid his dues for the year in which he wishes to be transferred to life membership, or has paid his dues for any future year or years, the amount so paid shall be deducted from the fee for life membership.

ARTICLE X

Sec. 2. One copy of the PROCEEDINGS, when published, shall be furnished to each regular and associate member (in return for dues paid), to each life member (in return for life membership fee paid), to honorary members, to each corresponding society of the Institute, and to such libraries and periodicals as may be determined upon by the Board of Control.

The PROCEEDINGS are published every two months, and anyone may subscribe for them. The annual subscription is $3.00; single copies, 50 cents. Annual dues for members and associate members, $2.00. Fee for life membership, $30.00.

All letters should be addressed U. S. Naval Institute, Annapolis, Md., and all checks, drafts, and money orders should be made payable to the same.

SPECIAL NOTICE

NAVAL INSTITUTE PRIZE ESSAY, 1916

A prize of two hundred dollars, with a gold medal, and a life-membership in the Institute, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession.

On the opposite page are given suggested topics. Essays are not limited to these topics and no additional weight will be given an essay in awarding the prize because it is written on one of these suggested topics over one written on any subject pertaining to the naval profession.

The following rules will govern this competition:

1. The award for the prize will be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1916. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the PROCEEDINGS of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the PROCEEDINGS of the Institute, after it leaves the hands of the Board.

4. If, in the opinion of the Board of Control, the best essay presented is not of sufficient merit to be awarded the prize, it may receive "Honorable Mention" or such other distinction as the Board may decide.

5. In case one or more essays receive "Honorable Mention," the writers thereof will receive a minimum prize of seventy-five dollars and a life-membership in the Institute, the actual amounts of the awards to be decided by the Board of Control in each case.

6. Any essay not having received honorable mention may be published also, at the discretion of the Board of Control, but only with the consent of the author.

7. The essay is limited to fifty (50) printed pages in the PROCEEDINGS of the Institute.

8. It is requested that all essays be submitted typewritten and in duplicate, if practicable; essays submitted written in longhand and in single copy will, however, receive equal consideration.

9. In the event of the prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of the gold medal.

By direction of the Board of Control.

B. C. ALLEN,
Lieut. Commander, U. S. N., Secretary and Treasurer.

PRIZE ESSAY TOPICS

SUGGESTED AT THE INVITATION OF THE BOARD OF CONTROL

BY

THE PRESIDENT OF THE NAVAL INSTITUTE, THE SUPERINTENDENT OF THE NAVAL ACADEMY, THE PRESIDENT OF THE NAVAL WAR COLLEGE, AND THE COMMANDERS-IN-CHIEF OF THE ATLANTIC, PACIFIC AND ASIATIC FLEETS.

"The Mutual Relations of Gunnery and Tactics."

"The Place of the Naval Officer in International Affairs."

"The Evolution of Naval Doctrine from National Character."

"The Training of Enlisted Personnel to Produce Modern Man-o'-Warsmen: (a) Military Training; (b) Moral Training; (c) Education."

"The Organization, Employment and Training of Reserve Fleets and Flotillas."

"A Personnel Reserve for the Naval Service."

"Value of Speed as an Offensive Element in Battleship Strategy and Tactics, as Compared with Armor."

LIST OF PRIZE ESSAYS

1879

Naval Education. Prize Essay, 1879. By Lieut.-Com. A. D. Brown, U. S. N.

NAVAL EDUCATION. First Honorable Mention. By Lieut.-Com. C. F. Goodrich, U. S. N.

NAVAL EDUCATION. Second Honorable Mention. By Commander A. T. Mahan, U. S. N.

1880

"The Naval Policy of the United States." Prize Essay, 1880. By Lieutenant Charles Belknap, U. S. N.

1881

The Type of (I) Armored Vessel, (II) Cruiser best suited to the Present Needs of the United States. Prize Essay, 1881. By Lieutenant E. W. Very, U. S. N.

SECOND PRIZE ESSAY, 1881. By Lieutenant Seaton Schroeder, U. S. N.

1882

Our Merchant Marine: The Causes of its Decline and the Means to be taken for its Revival. "Nil clarius aquis." Prize Essay, 1882. By Lieutenant J. D. J. Kelley, U. S. N.

"MAIS IL FAUT CULTIVER NOTRE JARDIN." Honorable Mention. By Master C. G. Calkins, U. S. N.

"SPERO MELIORA." Honorable Mention. By Lieut.-Com. F. E. Chadwick, U. S. N.

"CAUSA LATET: VIS EST NOTISSIMA." Honorable Mention. By Lieutenant R. Wainwright, U. S. N.

1883

How may the Sphere of Usefulness of Naval Officers be extended in Time of Peace with Advantage to the Country and the Naval Service? "Pour encourager les Autres." Prize Essay, 1883. By Lieutenant Carlos G. Calkins, U. S. N.

"SEMPER PARATUS." First Honorable Mention. By Commander N. H. Farquhar, U. S. N.

"CULIBET IN ARTE SUA CREDENDUM EST." Second Honorable Mention. By Captain A. P. Cooke, U. S. N.

1884

The Reconstruction and Increase of the Navy. Prize Essay, 1884. By Ensign W. I. Chambers, U. S. N.

1885

Inducements for Retaining Trained Seamen in the Navy, and Best System of Rewards for Long and Faithful Service. Prize Essay, 1885. By Commander N. H. Farquhar, U. S. N.

1886

What Changes in Organization and Drill are Necessary to Sail and Fight Effectively Our Warships of Latest Type? "Scire quod nescias." Prize Essay, 1886. By Lieutenant Carlos G. Calkins, U. S. N.

THE RESULT OF ALL NAVAL ADMINISTRATION AND EFFORTS FINDS ITS EXPRESSION IN GOOD ORGANIZATION AND THOROUGH DRILL ON BOARD OF SUITABLE SHIPS. Honorable Mention. By Ensign W. L. Rodgers, U. S. N.

1887

The Naval Brigade: its Organization, Equipment and Tactics. "In hoc signo vinces." Prize Essay, 1887. By Lieutenant C. T. Hutchins.

1888

Torpedoes. Prize Essay, 1888. By Lieut.-Com. W. W. Reisinger, U. S. N.

1891

The Enlistment, Training and Organization of Crews for our Ships of War. Prize Essay, 1891. By Ensign A. P. Niblack, U. S. N.

DISPOSITION AND EMPLOYMENT OF THE FLEET: SHIP AND SQUADRON DRILL. Honorable Mention, 1891. By Lieutenant R. C. Smith, U. S. N.

1892

Torpedo-boats: their Organization and Conduct. Prize Essay, 1892. By Wm. Laird Clowes.

1894

The U. S. S. Vesuvius, with Special Reference to her Pneumatic Battery. Prize Essay, 1894. By Lieut.-Com. Seaton Schroeder, U. S. N.

NAVAL REFORM. Honorable Mention, 1894. By Passed Assistant Engineer F. M. Bennett, U. S. N.

1895

Tactical Problems in Naval Warfare. Prize Essay, 1895. By Lieut.-Com. Richard Wainwright, U. S. N.

A SUMMARY OF THE SITUATION AND OUTLOOK IN EUROPE. An Introduction to the Study of Coming War. Honorable Mention, 1895. By Richmond Pearson Hobson, Assistant Naval Constructor, U. S. N.

SUGGESTIONS FOR INCREASING THE EFFICIENCY OF OUR NEW SHIPS. Honorable Mention, 1895. By Naval Constructor Wm. J. Baxter, U. S. N.

THE BATTLE OF THE YALU. Honorable Mention, 1895. By Ensign Frank Marble, U. S. N.

1896

The Tactics of Ships in the Line of Battle. Prize Essay, 1896. By Lieutenant A. P. Niblack, U. S. N.

THE ORGANIZATION, TRAINING AND DISCIPLINE OF THE NAVY PERSONNEL AS VIEWED FROM THE SHIP. Honorable Mention, 1896. By Lieutenant Wm. F. Fullam, U. S. N.

NAVAL APPRENTICES, INDUCEMENTS, ENLISTING AND TRAINING. The Seaman Branch of the Navy. Honorable Mention, 1896. By Ensign Ryland D. Tisdale, U. S. N.

THE COMPOSITION OF THE FLEET. Honorable Mention, 1896. By Lieutenant John M. Ellicott, U. S. N.

1897

Torpedo-boat Policy. Prize Essay, 1897. By Lieutenant R. C. Smith, U. S. N.

A PROPOSED UNIFORM COURSE OF INSTRUCTION FOR THE NAVAL MILITIA. Honorable Mention, 1897. By H. G. Dohrman, Associate Member, U. S. N. I.

TORPEDOES IN EXERCISE AND BATTLE. Honorable Mention, 1897. By Lieutenant J. M. Ellicott, U. S. N.

1898

Esprit de Corps: A Tract for the Times. Prize Essay, 1898. By Captain Caspar Frederick Goodrich, U. S. N.

OUR NAVAL POWER. Honorable Mention, 1898. By Lieut.-Com. Richard Wainwright, U. S. N.

TARGET PRACTICE AND THE TRAINING OF GUN CAPTAINS. Honorable Mention, 1898. By Ensign R. H. Jackson, U. S. N.

1900

Torpedo Craft: Types and Employment. Prize Essay, 1900. By Lieutenant R. H. Jackson, U. S. N.

THE AUTOMOBILE TORPEDO AND ITS USES. Honorable Mention, 1900. By Lieutenant L. H. Chandler, U. S. N.

1901

Naval Administration and Organization. Prize Essay, 1901. By Lieutenant John Hood, U. S. N.

1903

Gunnery in Our Navy. The Causes of its Inferiority and Their Remedies. Prize Essay, 1903. By Professor Philip R. Alger, U. S. N.

A NAVAL TRAINING POLICY AND SYSTEM. Honorable Mention, 1903. By Lieutenant James H. Reid, U. S. N.

SYSTEMATIC TRAINING OF THE ENLISTED PERSONNEL OF THE NAVY. Honorable Mention, 1903. By Lieutenant C. L. Hussey, U. S. N.

OUR TORPEDO-BOAT FLOTILLA. The Training Needed to Insure its Efficiency. Honorable Mention, 1903. By Lieutenant E. L. Beach, U. S. N.

1904

The Fleet and Its Personnel. Prize Essay, 1904. By Lieutenant S. P. Fullinwider, U. S. N.

A PLEA FOR A HIGHER PHYSICAL, MORAL AND INTELLECTUAL STANDARD OF THE PERSONNEL FOR THE NAVY. Honorable Mention, 1904. By Medical Inspector Howard E. Ames, U. S. N.

1905

American Naval Policy. Prize Essay, 1905. By Commander Bradley A. Fiske, U. S. N.

THE DEPARTMENT OF THE NAVY. Honorable Mention, 1905. By Rear-Admiral Stephen B. Luce, U. S. N.

1906

Promotion by Selection. Prize Essay, 1906. By Commander Hawley O. Rittenhouse, U. S. N.

THE ELEMENTS OF FLEET TACTICS. First Honorable Mention, 1906. By Lieut.-Com. A. P. Niblack, U. S. N.

GLEANINGS FROM THE SEA OF JAPAN. Second Honorable Mention, 1906. By Captain Seaton Schroeder, U. S. N.

THE PURCHASE SYSTEM OF THE NAVY. Third Honorable Mention, 1906. By Pay Inspector J. A. Mudd, U. S. N.

1907

Storekeeping at the Navy Yards. Prize Essay, 1907. By Pay Inspector John A. Mudd, U. S. N.

BATTLE REHEARSALS. A few thoughts on our next step in Fleet-Gunnery. First Honorable Mention, 1907. By Lieut.-Comdr. Yates Stirling, U. S. N.

THE NAVAL PROFESSION. Second Honorable Mention, 1907. By Commander Bradley A. Fiske, U. S. N.

1908

A Few Hints to the Study of Naval Tactics. Prize Essay, 1908. By Lieutenant W. S. Pye, U. S. N.

THE MONEY FOR THE NAVY. First Honorable Mention, 1908. By Pay Inspector John A. Mudd, U. S. N.

THE NATION'S DEFENCE—THE OFFENSIVE FLEET. How Shall We Prepare It for Battle? Second Honorable Mention, 1908. By Lieut.-Commander Yates Stirling, U. S. N.

1909

Some Ideas about Organization on Board Ship. Prize Essay, 1909. By Lieutenant Ernest J. King, U. S. N.

THE NAVY AND COAST DEFENCE. Honorable Mention, 1909. By Commodore W. H. Beehler, U. S. N.

THE REORGANIZATION OF THE NAVAL ESTABLISHMENT. Honorable Mention, 1909. By Pay Inspector J. A. Mudd, U. S. N.

A PLEA FOR PHYSICAL TRAINING IN THE NAVY. Honorable Mention, 1909. By Commander A. P. Niblack, U. S. N.

1910

The Merchant Marine and the Navy. Prize Essay, 1910. By Naval Constructor T. G. Roberts, U. S. N.

THE NAVAL STRATEGY OF THE RUSSO-JAPANESE WAR. Honorable Mention, 1910. By Lieutenant Lyman A. Cotten, U. S. N.

1911

Navy Yard Economy. Prize Essay, 1911. By Paymaster Charles Conard, U. S. N.

NAVAL POWER. Honorable Mention, 1911. By Captain Bradley A. Fiske, U. S. N.

WANTED—FIRST AID. Honorable Mention, 1911. By Commander C. C. Marsh, U. S. N.

1912

Naval Might. Prize Essay, 1912. By Lieutenant Ridgely Hunt, U. S. N. (retired).

INSPECTION DUTY AT THE NAVY YARDS. Honorable Mention, 1912. By Lieut.-Commander T. D. Parker, U. S. N.

1913

The Greatest Need of the Atlantic Fleet. Prize Essay, 1913. By Lieut.-Commander Harry E. Yarnell, U. S. N.

NAVY DEPARTMENT ORGANIZATION. A Study of Principles. First Honorable Mention, 1913. By Commander Yates Stirling, Jr., U. S. N.

TRAINED INITIATIVE AND UNITY OF ACTION. Second Honorable Mention, 1913. By Lieut.-Commander Dudley W. Knox, U. S. N.

1914

The Great Lesson from Nelson for To-Day. Prize Essay, 1914. By Lieutenant Commander Dudley W. Knox, U. S. Navy.

NAVAL POLICY AS IT RELATES TO THE SHORE ESTABLISHMENT AND THE MAINTENANCE OF THE FLEET. Honorable Mention, 1914. By Captain John Hood, U. S. Navy.

OLD PRINCIPLES AND MODERN APPLICATIONS. Honorable Mention, 1914. By Lieutenant Commander Dudley W. Knox, U. S. Navy.

MILITARY PREPAREDNESS. Honorable Mention, 1914. By Naval Constructor Richard D. Gatewood, U. S. Navy.